SEPTEMBER, 1951

Traffic Engineering

The 1951 Convention City—Los Angeles, California

- Traffic Engineering in the Convention City of 1951
- Statistical Instruments for Traffic Engineers
- Traffic Engineering in Connecticut's State Highway Department
- Some Flow Characteristics of a Three-Lane One-Way Roadway
- Traffic Problems of a District Engineer
- Freeway Construction in Los Angeles

Official Publication of the Institute of Traffic Engineers

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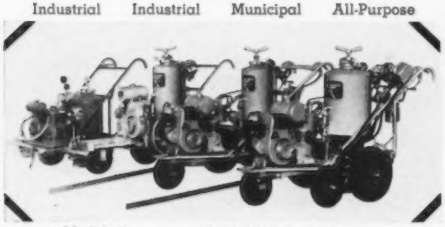

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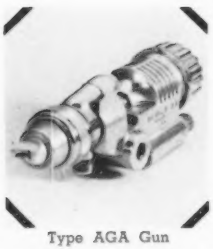

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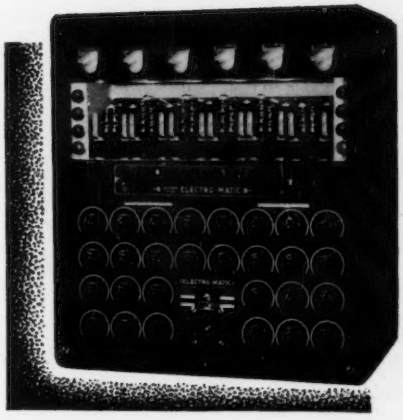

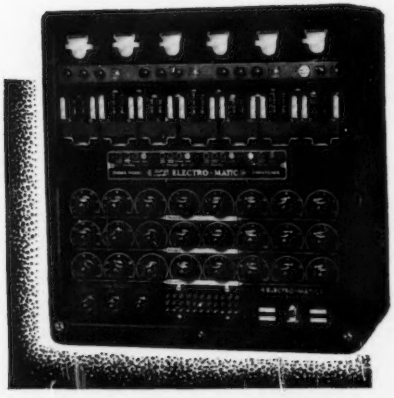

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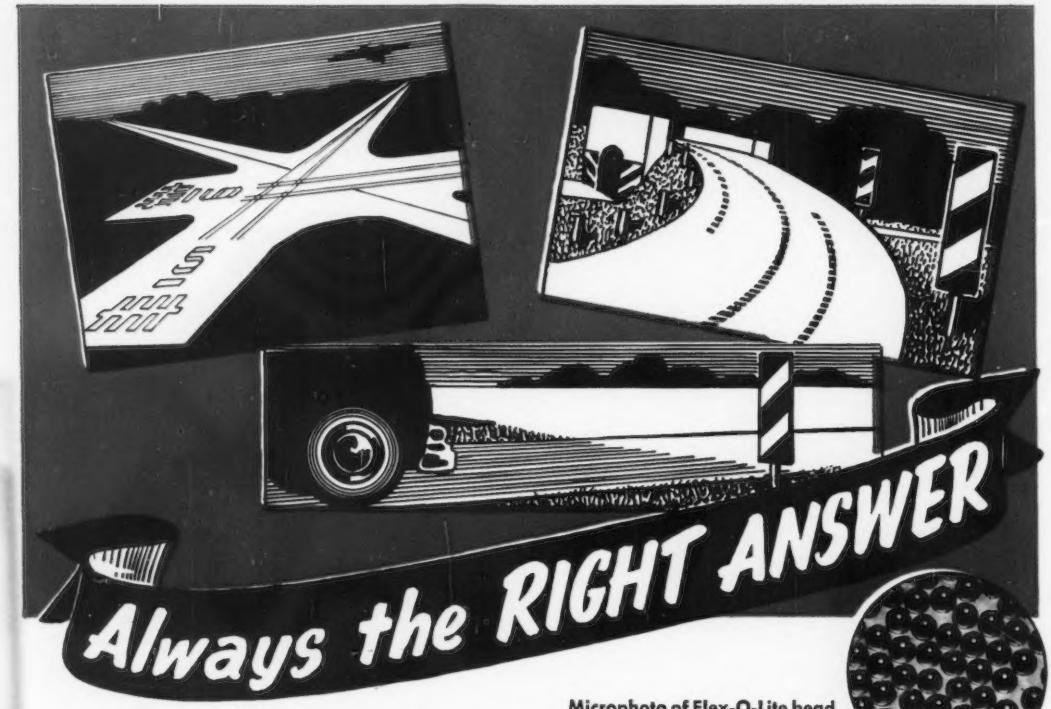

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Traffic Engineering

OFFICIAL PUBLICATION OF THE INSTITUTE OF TRAFFIC ENGINEERS

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COVER: View along Wilshire Boulevard at MacArthur Park in Los Angeles, California. *Photo by Los Angeles Chamber of Commerce*

Traffic Engineering is that phase of engineering which deals with the planning and geometric design of streets, highways, and abutting lands, and with traffic operation thereon, as their use is related to the safe, convenient, and economic transportation of persons and goods.

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Welcome To California

IT is a rare privilege to welcome the members of the Institute of Traffic Engineers to California.

Representing the largest Section of the *Institute*, the Western Section through its members joins me in urging you to come to the 22nd Annual Convention, to be held at the Ambassador Hotel, Los Angeles, September 23rd to the 27th.

Since the days of the Spanish Conquistadores and the gentler Father Junipero Serra, our California people have been highway traffic and transportation conscious. The greatest trek of the first one hundred years of American History was when the Argonauts wended their difficult way to California in the search for gold. They took some of the gold back with them but they did not deplete the unlimited supply of contentment and harmony which has smiled on California since the dawn of time. We are urging you take a trek, and *your* way will be much easier. The members of the Western Section, its committee, and the people of Southern California will attempt to provide *you* with the wealth of contentment and pleasure.

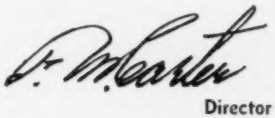
The consciousness of the need for highways has been a dominant factor in the development of California as a State and its citizens and legislature are continuously striving to build better and safer highways. Our present highway system had a very natural and logical development which dates back about 175 years. San Francisco has just observed its 175th anniversary and the building of the famous El Camino Real—a highway constructed to connect the missions of California. De Anza, Don Casper de portola—blazing pioneer trails—Father Serra and his brother Franciscan missionaries—the trappers, traders and the restless adventurous horde all helped develop this State. The Covered Wagon was supplemented by the Iron Horse and the coming of the Horseless Carriage brought forth an unending struggle to keep ahead of the growing population with better and safer highways. The rapid increase in population and the number of automobiles for the transportation of that population have tested the traffic engineers of this State and its Cities. They have met the challenge with the cooperation of the governing and financing bodies.

Many of you will come over these highways—you will realize that our highways and your highways have a direct bearing on the preservation of our independence and our national defense—we all must expand them to protect our nation. It is through your efforts in cooperation with our own that new ideas and construction methods are developed. Because we live in a neighborly nation all states benefit by sharing the results obtained by research and development.

A special invitation and welcome is extended to the ladies of the *Institute* members. Our Committee has arranged a full program for your enjoyment and stay in California.

Governor Earl Warren joins me and the members of the Western Section in welcoming you to California for the 22nd Annual Convention of the Institute of Traffic Engineers.

Be sure to come.



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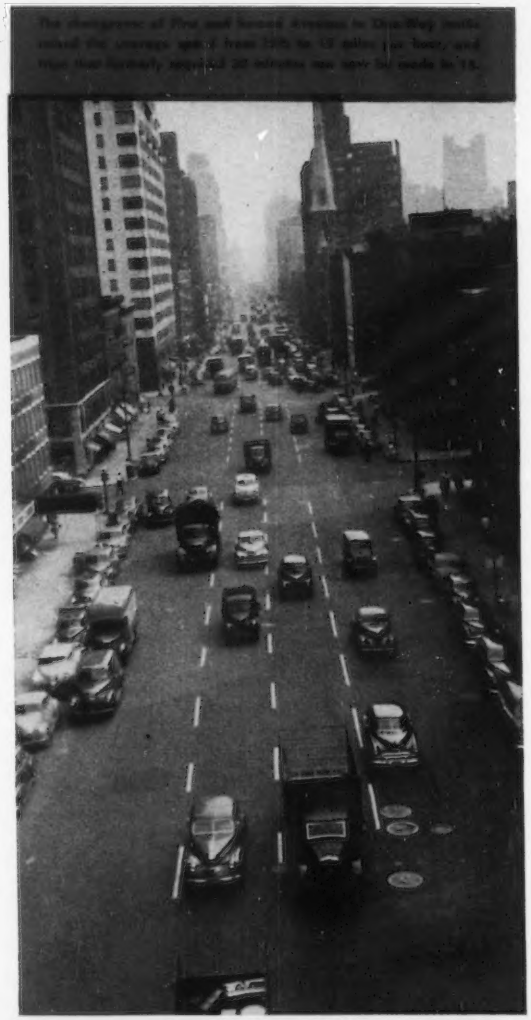

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Traffic Engineering In The Convention City Of 1951

By Ralph T. Dorsey (Mem., ITE)
Traffic Engineer, City of Los Angeles, California

This is the fourth in a series of articles to be published in "Traffic Engineering" magazine, and written by traffic engineers of cities of various sizes in several parts of the country.

THE origins of traffic engineering in Los Angeles are found in the post-war era of World War I. Los Angeles at that time enjoyed a sudden and remarkable growth, that growth being coincident with the public acceptance of the automobile as a means of travel.

There were at the time some rail lines in the County of Los Angeles and the only business district of any importance was the area of downtown Los Angeles known today as the Central Traffic District. The rapid rise in automobile use during those years gave rise to demands for some type of control other than the ancient methods of police officer control. Experiments were therefore made with various types of automatic control devices, the City Council calling for submission of ideas and working models of traffic signals. No traffic signal companies were functioning on a nation-wide basis and 18 experimental models were accepted for trial. In October of 1920, the first large scale installation of traffic signals was carried out, involving the use of the semaphore type signals with lights at seven intersections in the heart of the Central Traffic District, on Broadway. These signals were cable connected and were controlled from a master board in the basement of one of the large buildings.

Results of these signals and the other experimental types were studied and some time later, the City Council adopted the semaphore arm traffic signal with supplementary lights and bells as the official traffic signal of this city. This signal was a patented device manufactured by the Acme Traffic Signal Company, a local concern.

In 1923, the position of Traffic Engineer was created, the responsibility of studying traffic signal locations, installing and maintaining traffic signals and making recommendations concerning their use was concentrated under this position. The Traffic Engineer was under the Bureau of Electricity, a sub-division of the Board of Public Works.

During that era there was developed the use of stop signs. The function of studying locations for stop signs and recommending for or against their use at certain locations was placed under the Traffic Engineer, this control also was effected over the location of parking control signs. Actual installation and maintenance was carried out by the Automobile Club at that time.

In 1928, after being successively under the control of the Bureau of Electricity and the Bureau of Building and Safety, the infant traffic engineering organization was transferred to the Police Department as a division. Up to that time, the painting of curb zones and other street markings had been under the direct control of the Police Department. These functions were then consolidated with the other traffic engineering functions into the Traffic Engineering Division. At that time, therefore, the Traffic Engineering Division in the City of Los Angeles contained the principal elements of a traffic engineering group, these elements being control over the location, installation and maintenance of all traffic signs, signals and markings.

Photos by F. Hellwell

Off-center lane treatment, Figueroa Street south of Sunset Boulevard.

It is perhaps inaccurate to say that complete control over sign posting was under the jurisdiction of the Traffic Engineering Division, since actual posting was carried out by the Automobile Club. This function was gradually transferred to the Traffic Engineering Division, however, so that over the years the Automobile Club has ceased entirely to carry out installation or maintenance of any control device in the city.

Traffic Engineering Department Created

In 1932, the City Council established a separate department of Traffic Engineering. This action was carried out in accordance with the provision of a far-sighted section incorporated into the Charter of this city in 1924, which section provided for the creation of a Commission, with the responsibility of making studies concerning the use of streets together with all the other elements necessary for the creation of a separate group for control of traffic matters. This provision, however, stated that these functions could be

assigned to an existing commission. Under this stipulation, the responsibility had been assigned to various commissions from time to time, as has been seen.

The Traffic Commission of 1932, however, had a short life. It perhaps was too far ahead of its time and within a period of a few months it was abolished and all of the functions relating thereto were consolidated into a separate bureau of the Police Department. The Council, however, retained a degree of control by requiring a separate budget for that bureau.

The Bureau of Street Traffic Engineering, as it was known, carried out all of the traffic engineering functions in the city, responsible only to the Police Commission. This situation existed for 16 years, until in 1948, as a result of a general survey of traffic engineering in Los Angeles, the City Council created the Traffic Engineering Commission and the Department of Traffic Engineering. Thus, traffic engineering was placed on a plane equal to that of police administration, public works and others.

Authorities of Traffic Commission

The Traffic Engineering Commission has been delegated certain powers by the Council in addition to those involved under the Charter. These will be listed briefly without explanation, in order to give an idea of the general nature of work of the Commission and Department. The Commission may on its own authority order the following installations:

Traffic signals
Stop signs
All types of warning and guide signs
Speed signs
Crosswalks
Curb zones
Lane lines and centerlines
Parking limit signs
Parking prohibition signs, with exception noted below
Lighting of islands
Turning prohibitions
Safety zones (street car)
Others

The Commission also has authority to order or recommend the following controls, subject to approval of the Council:

Offcenter lane movement
Peak hour prohibition of parking
35 and 45 mph speed limits
One-way streets
Parking meters

Construction on Pershing Square Underground Garage.

All of the control devices referred to above are installed and maintained by the Department of Traffic Engineering upon the order of the Commission. In each case, a study is conducted and a report submitted to the Commission recommending for or against control devices at requested locations. In addition, the department initiates many studies for control devices, reporting thereon to the Commission.

In addition to the duties outlined above, the Department of Traffic Engineering acts in an advisory manner on the design of islands, roadways, freeway ramps, driveway locations and similar matters, although no specific regulation so requires.

In addition to these functions, the Commission and Department will soon be charged with issuance of certain types of street use permits, for private vehicles used for commercial purposes, entitling such vehicles to use loading zones; searchlights and other miscellaneous permits. With regard to the searchlights, it might be explained that the large scale use of these lights for advertising motion picture premieres, the opening of department stores and hot dog stands is indigenous to Southern California, particularly Los Angeles.

Personnel of Commission and Department

To carry out the above functions, there is a Traffic Engineering Commission consisting of five members, all laymen appointed by the Mayor, with a small staff consisting of a secretary and a clerk. The Department has a large staff, consisting primarily of personnel involved in the installation and maintenance of control devices. At the present time, there are 264 positions in the department.

These positions are broken down into general groups as shown below:

Commission Personnel	7
Traffic Engineering Personnel (Traffic Engineers, Associates, Assistants, Checkers)	28
Clerical Personnel	19
Personnel installing and maintaining traffic signals	108
Personnel installing and maintaining traffic signs and markings	92
Personnel maintaining vehicles	8
General Foreman	1
Sign painter	1

Certain policies followed should be noted for interpretation of the above. The presence of a single sign painter in the department is due directly to the policy of purchasing porcelain enamel signs on open bid for all permanent work. This is the same policy followed by the State of California, based upon the fact that porcelain enamel signs have a very long life expectancy. Such signs do not require repainting every few years and the slightly higher initial cost is greatly offset by the elimination of a large staff of sign-painting personnel, heavy repainting schedules and other overhead.

Until recently, the number of traffic checkers and clerical personnel employed was considerably higher. Due to the difficulty of obtaining large quantities of signal equipment, the necessity of carrying out traffic checks on a wide scale has been lessened, and the number of checking personnel

has accordingly been reduced. Certain clerical personnel were eliminated by the use of forms and other methods to supplant typewritten reports for each investigation.

It may be noted that three radio technicians are included among traffic signal maintenance personnel. These technicians are required to maintain the two-way radio equipment provided in all traffic signal maintenance trucks, and to maintain the traffic signal controllers of the electronic type, which are being increasingly used. The two-way radio trucks receive calls on mal-functioning signal equipment through the police radio system.

The General Foreman provided in the above is in general charge of all field functions.

Central and Branch Offices

The personnel shown herein is distributed over four separate yards and two officers. The great land area encompassed within the City of Los Angeles, totaling 453 square miles, is such that proper maintenance cannot be afforded from a single shop facility without undue cost in travel time. Branch shops have therefore been provided in the San Fernando Valley area, the West Los Angeles area and the Harbor area, with the Central shop being retained close to the Central Traffic District. Crews for installing and maintaining traffic signals, signs and markings are divided among the shops in proportion to the amount of work involved in each area.

The Central office has always been in the City Hall and at present, the Traffic Engineering Department occupies the entire tenth floor of the City Hall. On this floor are located the Commission offices, the General Manager's office, and the principal traffic engineering and clerical functions.

The branch office is located in the West Los Angeles City Hall. This office is headed by an Associate, with a staff of two investigators and a stenographer. All routine requests and some special matters from the western part of the city are handled in this office. The establishment of a separate branch office in the San Fernando Valley is being sought, but this has not been accomplished to date due to the lack of city office space.

Growth and Scope of Traffic Demands

While statistics are inherently dry, it is necessary to present some herein in order to allow an understanding of the growth of the City of Los Angeles and with it the growth and scope of the problem of traffic engineering. Some statistics are therefore presented in the accompanying table to show these factors and if read in conjunction with preceding paragraphs explaining the development of the department as it exists today, will show the conditions now applying in the field of traffic engineering and the progress which has been made in traffic engineering.

	Downtown Cordon Count — 13 Hours	Veh. Registration L. A. City	Veh. Registration L. A. County	Population L. A. City	Population L. A. County
1924	313,272	318,000	540,172	880,478	1,509,318
1931	538,629	516,900	845,910	1,247,503	2,273,670
1937	589,075	601,000	1,051,056	1,357,852	2,553,170
1947	689,416	861,381	1,592,202	1,805,887	3,747,962
1950	663,848	1,086,086	2,007,552	1,957,692	4,125,164

MILES OF STREETS IN CITY—5,881
NUMBER OF INTERSECTIONS—30,000
MILES OF THOROUGHFARES—1,300

Regulations and Control Devices

As may be seen from the above, the present problem is one of employing the existing street system to its greatest capacity. The City of Los Angeles is peculiar among large American cities in the fact that its traffic flows are not confined to any appreciable extent by large bodies of water, rivers or other topographical conditions. The principal topographical barrier to traffic flow in Los Angeles is the mountain chain which separates the San Fernando Valley from the rest of the city, dividing the incorporated area of the city roughly in two. The traffic arteries carrying large flows through these mountains are few in number. Beyond this feature, however, traffic flows are not inhibited by such barriers and large traffic volumes exist on a number of thoroughfares forming a vast grid pattern of streets. The need for control is therefore not confined to this area or that area, but is widespread in all directions.

Freeway at four-level separation.

In order to meet this problem, an extensive traffic signal system has been developed and is being further refined. However this is far from sufficient. The concentration of traffic on many thoroughfares requires the greatest use of the roadways between curbs which can be devised.

The City of Los Angeles has therefore laid great emphasis on the prohibition of parking, particularly during the peak hours. Parking is prohibited from 7 a.m. to 6 p.m. on 22 miles of streets in the Central Traffic District. In addition, parking is prohibited during the morning and evening peak hours, or at any time, on an additional 225 miles of thoroughfares outside of the Central Traffic District.

Another device for the full use of the roadway is the off-center lane movement, developed in Los Angeles and employed extensively. It is now used on 25 miles of the most heavily traveled thoroughfares, the placing and removal of rubber cones and other markers for this purpose is carried out by the Department of Traffic Engineering on a daily schedule. This schedule requires the use of ten jeep trucks and 20 men.

To further increase the efficiency of intersectional control and allow the greatest capacity use of principal thoroughfares, signs are posted during the peak hours or other hours, on a daily schedule, at over 300 major intersections. This also involves the use of men and trucks on a regular schedule.

Again, in order to gain the highest efficiency from the street system and to promote safety, the Department of Traffic Engineering lays great emphasis upon the maintenance of center and lane line markings. Over 2,000 miles of such markings are maintained and on many streets, up to six lane lines are maintained in addition to the double centerlines. At one time, the city was using paint for these purposes in the amount of 120,000 gallons annually, but this figure has been reduced somewhat due to difficulties in obtaining sufficient supplies.

Within the department has been maintained a separate section for the study of high accident frequency locations. This section has also conducted all studies on the installation of stop signs. Through this type of work, specialized treatment for a large number of troublesome intersections, particularly minor intersections with abnormal accident histories, has been developed, contributing in a large way toward the overall reduction in fatalities reached in Los Angeles.

Street Lighting

The Traffic Engineering Department of Los Angeles does not maintain direct control of any type in the matter of installing street lighting, except that the department does install safety lighting at some high accident frequency intersections and safety lighting on traffic islands.

The street lighting program is carried out by the Bureau of Street Lighting of the Board of Public Works. This is a bureau operating on a separate budget, with no other functions. That bureau has been pursuing a policy of installing modern safety lighting on all major thoroughfares, in accordance with need as determined by accident histories. Accordingly, the ornamental street lighting which formerly existed on a large number of our major thoroughfares has been replaced competely with modern safety lighting to highest IES standards. In addition, all of the residential street lighting being installed at new locations is in accordance with IES specifications, so that at the end of the calendar year 1950, a total of 508 miles of streets were provided with modern safety lighting. As a separate program, the bureau has installed modern safety lighting at a very large number of high accident frequency intersections. Such installations normally include six posts, spaced to provide even lighting on the approaches and far sides of such intersections. It is the belief of this department that the street lighting program as carried out by the Bureau of Street Lighting has contributed in large measure toward the reduction of fatalities in Los Angeles.

The Department of Traffic Engineering cooperates with the Street Lighting Bureau through notification to that department of high accident frequency intersections at which nighttime accidents are predominant.

Freeway Program

The greatest traffic engineering effort being carried out in the County of Los Angeles at present is the freeway program. This is a program of the State of California and all particulars of the program are directed from and administered by the California Highway Department, through its area offices. All of the funds involved are state funds, being derived from a special 1.5 cents per gallon gasoline tax, earmarked specifically for the freeway program.

Typical treatment of major intersection worked out and installed through cooperation of California State Highway Department, City Engineer of Los Angeles, and City Traffic Engineer of Los Angeles.

Division VII of the California Highway Department administers the freeway program in the Los Angeles County area and in so doing cooperates closely with the City Engineer and the Traffic Engineer in Los Angeles. Much of the design of the freeways within the City of Los Angeles is actually carried out by the office of the City Engineer and in working out such design, a close liaison is maintained between the City Engineer and the Traffic Engineer. Final design is approved by the Highway Department and altered as necessary. The placing of contracts is carried out entirely by the Highway Department.

The California Highway Department is pursuing the policy in the County of Los Angeles of completing four major freeways as a primary objective in the entire freeway program. Those freeways are the Hollywood Freeway, the Harbor Freeway, the Santa Ana Freeway and the Ramona Freeway. Substantial portions of each of the above freeways except the Harbor Freeway are now open to traffic and construction is proceeding on all four.

In pursuing this construction, it has been necessary in many instances to do the most difficult tasks first, such as the construction of the four level cloverleaf structure adjacent to the intersection of Sunset Boulevard and Figueroa Street, the removal of the Fort Moore Hill in order to construct a freeway depressed below the level of the city street on each side of the hill and similar construction difficulties faced proceeding through the most highly developed areas.

Parking

Although faced with a traffic problem of very large scope due to the most intensive mass use of automobile transportation of any large city in the world, Los Angeles is indeed fortunate in one respect. The problem of providing offstreet parking space is one that has been solved in large part through the acts of private capital. Business in Los Angeles, particularly large retail business, has been acutely aware of the fact that the automobile is the most favored mode of transportation for shoppers. It is this factor, combined with the geography of the area, which led originally to the so-called "exploded" city.

Due to the flexibility of automobile transportation combined with the heavy dependency of the public on such transportation, it became apparent very early that the operation of large shopping centers outside of the Central Traffic District was feasible. Several such centers developed in the late 20's and early 30's. These in turn became congested and further centers developed. The success of each such center was dependent in large part upon accessibility to large residential areas and driving time. The requirement that parking facilities be provided for such shoppers was not immediately apparent in most cases to the businessmen involved, but did become apparent during the 30's, resulting in the provision of numerous offstreet parking lots by private capital, both large and small. Within the Central Traffic District, the provision of offstreet parking spaces did not lag seriously. As outside shopping areas developed, the down-

(Continued on page 415)

Statistical Instruments For Traffic Engineers

By Charles E. Haley* (Jun. Mem., ITE)
Assistant Traffic Engineer, Phoenix, Arizona

UNDER the auspices of the Vehicle Characteristics Committee, of the Highway Research Board, and with the cooperation of the Automobile Manufacturers Association, Chrysler Corporation, and General Motors Corporation, a group of instruments were designed to measure traffic and vehicle characteristics. These instruments were installed in a 1950 model Plymouth which was driven by the author during the tests described in this report.

Motor vehicles have many built-in characteristics which can be studied with interest. Of these, however, there are relatively few which are directly related to the vehicles' behavior on our highways and under traffic conditions. The committee selected for study, "Velocity," "Acceleration," "Deceleration," and "Fuel Economy" as being most basic. "Acceleration" was not recorded directly because a direct reading accelerometer would be too delicate and complicated for this type of work, but it was recorded as two related quantities, namely, engine torque and throttle opening. Engine torque and throttle opening are roughly proportional to acceleration. All instruments record their data in the form of numbers on banks of electric counters. The data, therefore, are statistical in nature and can be plotted in the form of graphs and charts.

Connections between the instruments and an automobile are quite easily made. They consist of certain electrical connections, a tube connection with the windshield wiper vacuum outlet, a "T" take-off drive from the speedometer cable, the installation of a contact section on the throttle, and the installation of a fuel meter in the gas line. Figure I shows the instruments as they were installed in the test car. *The complete design and calibration details of these instruments* will be made available by the Vehicle Characteristics Committee in the near future.

The data obtained from all instruments are in the form of accumulated numbers, each number being the sample of a condition over a short interval. All these instruments could have been designed so as to draw line charts of the different variables. Since, however, phenomena having to do with flow of traffic vary rapidly over wide ranges, analysis of line chart recordings would have involved a tremendous amount of calculation. The accumulating type of instrument permits a large number of samples to be taken rapidly and easily and reduces the work of analysis to a minimum.

The purpose of the testing program was to determine the utility of the information obtained by the use of these instruments and also to prove their durability. The testing program began in Detroit during April, 1950, with the cooperation of Mr. Al Malo (Mem., ITE), Detroit Traffic Engineer.

The test runs were made to compare Grand River Avenue, Detroit, with seven other Detroit streets. Grand River is a main radial thorouhfare which carries a volume of approximately 46,000 vehicles a day, and was the only Detroit street on which a "simultaneous" system of traffic signals was in operation. The 57 signalized intersections of the signal system on Grand River operated on a simultaneous 90-second cycle. With the given block lengths, this timing arrangement required numerous stops. The traffic on the seven other Detroit streets tested was controlled by a "progressive" system of signals. The "floating car" testing technique was used during all test runs where traffic was present, and when traffic became very light the posted speed limit was maintained.

Speed Comparisons

The results of sixty-five tests show that the average speeds on Grand River were 3 to 5 mph lower than on the other streets tested and that a larger percentage of time on Grand River was spent standing still than on any other street. The test results also show that the motorists using Grand River exceeded the speed limit, especially when traffic was heavy; but motorists using the other streets tested did not exceed the speed limit.

Figure II compares the speed data at 7:30 a.m. during one test on Grand River and one test on Woodward Avenue.

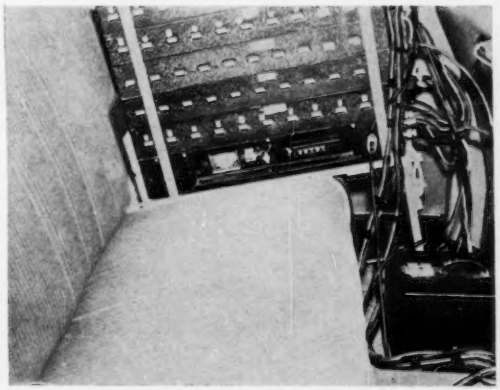


Fig. 1.
Recording bank and instruments.

*This is an original article written by Mr. Haley and based on research work for the Vehicle Characteristics Committee, Highway Research Board. Mr. Haley was Project Engineer for this Committee during 1950. Mr. T. J. Carmichael, General Motors Proving Ground, is Chairman of this Committee. The paper, "A Study of Vehicle, Roadway, and Traffic Relationships By Means of Statistical Instruments," was presented by Mr. Haley to the Highway Research Board, January 1951. Copies of the paper may be obtained from the Highway Research Board upon request.

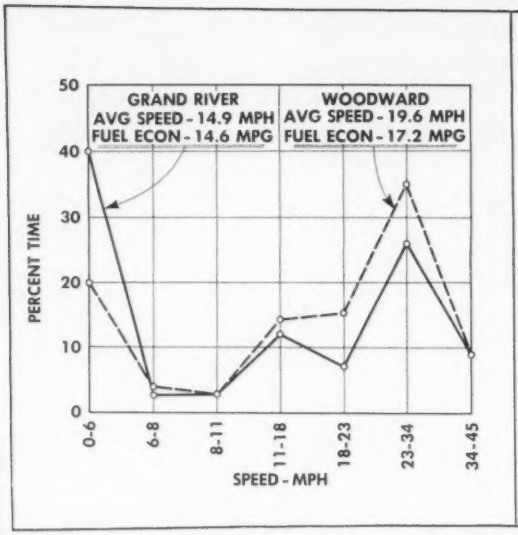


Fig. 2.
Comparison of speed and fuel economy on Grand River and Woodward Avenues.

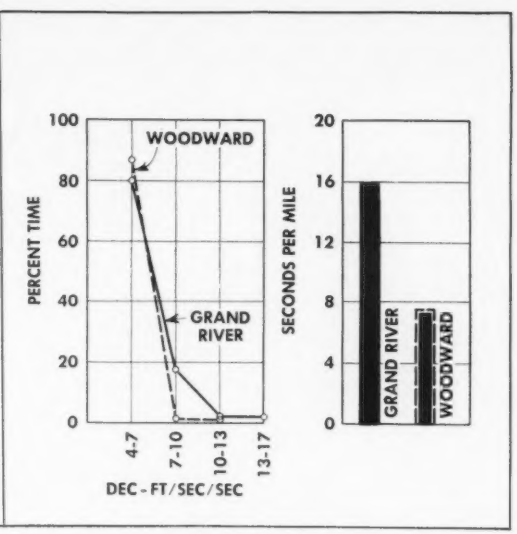


Fig. 3.
Comparison of braking on Grand River and Woodward Avenues.

For ease in comparison the percentage of time spent in the various speed ranges is plotted as a line graph rather than a bar graph. This speed comparison graph is representative of all the tests made during the rush hours. The highest percentage of time, forty percent, on Grand River was spent travelling 0 to 6 mph, while on the other streets the highest percentage of time was spent in travelling from 23 to 34 mph. The time spent in the 0 to 6 mph range was approximately the time spent standing still because the test car travelled at 8 mph in third gear with the throttle in the idle position. Therefore, more time was spent standing still than in any speed range on Grand River during the rush hours.

Although the average speed was only 14.9 mph at 7:30 a.m. on Grand River, nine per cent of the total trip time was spent in the 34 to 45 mph range even though the entire test run had a posted speed limit of 30 mph. At noon, five per cent of the total trip time was spent in this illegal speed range, while during the 5:00 p.m. rush hour, six per cent of the time was spent in this range. Thus, the motorists spent more time in the illegal speed range when traffic was heavy than they did when traffic was light. Woodward Avenue was the only street, other than Grand River, on which the traffic travelled in the 34 to 45 mph speed range, but Woodward was posted for 35 mph, or faster, for about two miles of the 8.8 mile test run.

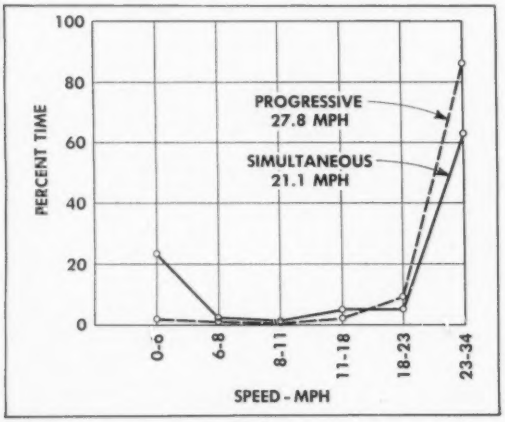


Fig. 4.
Speed comparison, before and after signal timing improvements on Grand River Avenue.

Fuel Economy

The fuel economy data show a loss in fuel economy due to traffic congestion, whether real, as in the case of heavy traffic, or because of artificial congestion, as in the case of the "simultaneous" system of traffic signals. The fuel economy was low on Grand River because a larger percentage of the total fuel used was used at the lower speeds. Nineteen per cent of the fuel consumed during tests on Grand River was consumed in the speeds from 0 to 11 mph while only about one-half as much, 10 per cent, was consumed in this same speed range, 0 to 11 mph, on the other streets.

The average fuel economy for all runs made in heavy traffic on Grand River was 14.0 mpg, and in heavy traffic the other streets tested averaged 16.7 mpg. In the light traffic the average gasoline mileage obtained was 16.0 mpg on Grand River and 19.8 mpg on the other streets. The loss in fuel economy due to the timing of traffic signals cost the 46,000 motorists who used Grand River each day almost a *quarter of a million dollars each year.*

Braking

Figure III is representative of the braking data obtained. The line graph which indicates intensity of braking, shows the percentage of braking time spent in each of the ranges of deceleration, while the bar graph indicates the amount of braking, expressed in seconds of braking, per mile. In general, the undesirable and even dangerous rates of deceleration were used more often on Grand River and twice the amount of braking was generally used on Grand River as

compared to the other streets. Because the motorists had to stop every fifty-one seconds on Grand River, they used their brakes almost as much in light traffic as they did in heavy traffic.

"Before" and "After" Study

Prior to June 3, 1950, the "simultaneous" signal system on Grand River Avenue, Detroit, was in operation twenty-four hours a day. After this date a "progressive" system was placed in operation during the late evening and early morning hours, extending from downtown Detroit for a distance of 5.8 miles. Thus was presented an opportunity to show directly how well the instruments would record the differences between vehicle operating characteristics under the two systems, on the same street.

The results of eight test runs show that during the early morning hours the "simultaneous" system permitted an average speed twenty-four per cent less than the "progressive" system, 21.1 mph compared with 27.8 mph, and yielded an average fuel economy twenty-four per cent lower than the "progressive" system, 18.0 mpg as compared with 23.8 mpg. Thus the "simultaneous" system here lowered significantly the speed and economy of individual transportation. Figures IV through VIII show the results of this "before and after" study on Grand River. At no time during the tests did traffic hinder the test car. The speed limit of 30 mph was maintained except when traffic lights forced the driver to stop. The only variable in the tests was the signal systems, the same car and driver being used for all tests.

Figure IV shows the distribution of time spent in the various speed ranges. The average speed was improved 6.7 mph by the "progressive" system, and this improvement was due to reducing the time spent standing still (i.e., 0-6 mph) by twenty-two per cent.

Figure V shows the speed ranges in which the fuel was consumed. The addition of 5.8 mpg to the fuel economy is highly significant with gasoline costing about 26 cents per gallon. This rise in fuel economy was accomplished by the reduction of the amount of fuel consumed in the lower speed ranges.

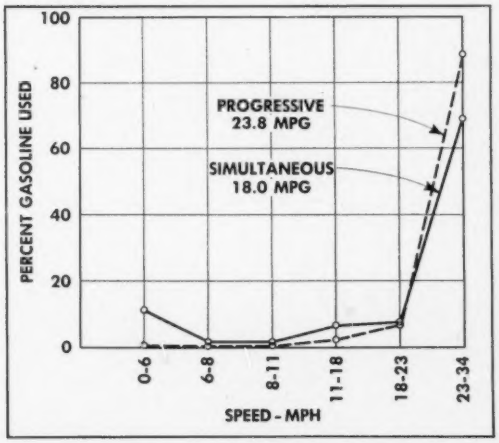


Fig. 5.
Fuel consumption comparison, before and after signal timing improvements on Grand River Avenue.

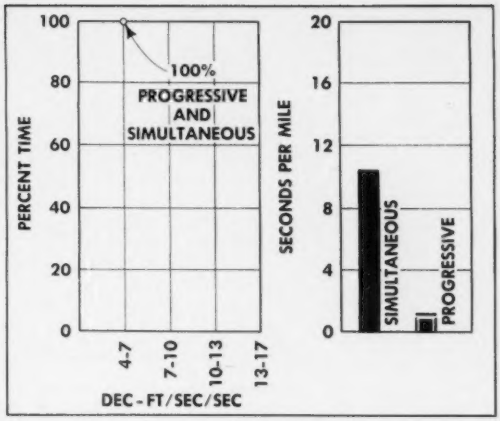


Fig. 6.
Braking comparison, before and after signal timing improvements on Grand River Avenue.

While all the braking during both tests was in the deceleration range of 4 to 7 ft. per sec., per sec. Figure VI shows that the amount of braking (represented by the bar graph) was greatly reduced by the "progressive" system, from 10.5 to 1.0 second per mile.

Conclusions

While the results may not be conclusive, they show a significant difference in traffic operations and economy caused by signal timing. Other projects undertaken were (1) the "rating" of highways; (2) driver characteristics; (3) one-way street operations; and (4) changes in route operations with increased volumes. Definitive results from these projects have not been obtained but very favorable conclusions may be drawn regarding the instruments and their use.

It is the opinion of the Committee on Vehicle Characteristics that extended development and use of instruments of this type permit a more conclusive analysis of vehicle performance, driver characteristics, highway design and traffic regulation.

United Nations Underground Garage Houses 1,500 Cars

The underground garage of the new United Nations Headquarters at New York City, New York (U. S. A.), will cost approximately (U. S.) $4,000,000, and will provide parking space for 1,500 cars. It is constructed underground on three separate levels interconnected by circular ramps.

Exits and entrances to the garage are provided at the south end of the site, at 42nd Street; at the north end, at 48th Street and the East River; and off First Avenue in the plaza area in front of the Secretariat building. Direct access will be possible from the garage to both the General Assembly building and the Secretariat building.

Ohio Turnpike

The Ohio Supreme Court has upheld the constitutionality of legislation establishing a state turnpike. The action came through an order requiring the State Auditor to approve payment for preliminary surveys of the turnpike across northern Ohio.

Traffic Engineering In Connecticut's State Highway Department

By G. Albert Hill
State Highway Commissioner
Connecticut State Highway Department, Hartford, Connecticut

TRAFFIC engineering was established as a separate entity in the Connecticut State Highway Department in 1931. Since that time the department has striven to achieve a simple goal, the application of intelligent progress to the facilitation of traffic on the state's highways.

It is hard to say which came first, the recognition by engineers of the need for traffic control or the recognition by the highway users that something more was necessary than the separate ideas of all vehicle operators and pedestrians. Whichever came first, traffic engineering as practiced in Connecticut is the outgrowth of the need by the average citizen for expert handling of his traffic problems. He needs someone or something to provide for the orderly, efficient and safe movement of both his vehicles and himself, when he is on foot. Traffic engineering in the Connecticut State Highway Department undertakes to provide those things for him on the state highways. In addition the same engineers apply themselves from time to time to those local road problems which are referred to the State Traffic Commission under the terms of Connecticut's uniform traffic control act.

Bureau of Traffic-Planning-Design

The traffic division of the State Highway Department in Connecticut is one of the three divisions of the Bureau of Traffic-Planning-Design and its task is stated briefly "to develop and apply traffic engineering techniques to the existing and future highway system which will increase the freedom of movement through the reduction of accidents and congestion."

As the name of the bureau indicates, the three main functions are carried out on a basis of equal rank. The planning division is concerned with all the factors of need for a highway and the design division with the task of designing the facility. The traffic division, in its field, overlaps and works with each of the other divisions on an equal footing.

Traffic Division

The Traffic Division is headed by the Engineer of Traffic and is composed of an Assistant Engineer of Traffic, three assistant highway engineers, three junior highway engineers and seven engineering aides in two classifications with necessary clerical and stenographic workers. This personnel performs all home office and field functions of the division.

Members of the traffic division are encouraged to participate in projects carried on by the Highway Research Board. In doing this they not only contribute knowledge gained at home but bring back for application in Connecticut the progressive ideas and useful experience of the other states.

The engineers charged with the operation of the division are called upon to devise remedies for existing traffic problems basing their recommendations upon information and techniques developed through constant research. Their solutions not only employ signs, signals, pavement markings and illumination but in many instances the redesign of a point of conflict which when completed will facilitate the movement of all types of traffic and increase the degree of safety on the highways concerned.

Design

Early in the development of the Connecticut traffic engineering program it was recognized that confinement of effort to the correction of the existing deficiencies was far from enough. The lack of permanence in this type of development led thought normally and directly into the field of highway design. For a number of years Connecticut's engineers have undertaken to make the information gathered on

Before — After
Channelization on South Meadows Expressway—temporary markers established the final design.

Before After

The addition of a special truck lane on "Clipper Hill."

the existing highway system serve as a measurement for safety and traffic control features to be designed for the future. Many of the more recent roads in Connecticut show variations in geometric design and control devices which reflect the progressive thinking developed through the continually expanding information that has been gathered from the old and applied to the new.

In this application of expanding traffic information to the problem of design there has been adopted within the Connecticut State Highway Department a policy of constant check by traffic engineers of vehicle maneuvers and driver behavior at locations where new design features are built into the new highways. The consideration of traffic control features begins at the start of design for a new highway. Design engineers apply all of the traffic engineering information at their disposal and the resulting design, in turn, is subject to careful review by traffic engineers. Thus each new facility has built into it all features which experience indicates to be beneficial to the user of the finished facility.

Regulations and Devices

Signs, signals and markings used by Connecticut on its state highway system, in fact, the entire system of marking and signaling in the state conforms almost exactly to the standards set up by the American Association of State Highway Officials. All of the devices that are part of the state highway system are maintained under the direct supervision of the traffic engineering division whose responsibility it was to provide for them in the first place.

Duties performed for the State Traffic Commission bring the engineers of the traffic division into close contact and cooperation with the State Police Department and with local police. Thus the reasoning of the traffic engineers is tempered with the practical enforcement experience of the uniformed police.

Accident Records

The accident records and other data necessary to the performance of the division are maintained on a continuing basis. At any particular time it is possible to break this information down for a specialized local need or to consider it as a whole in questions concerning large segments of the state highway system.

Conclusion

The original functions of the traffic engineering group in the Connecticut State Highway Department were limited to designing signs, signals, markings and other physical traffic regulatory devices and after their design, to the erection or installation of the devices at suitable points. All of this work was performed for the control of traffic on existing streets and highways.

This simple base has been broadened here as elsewhere in the country until the function of traffic engineering now includes the procurement, interpretation and application of traffic data. These cover roadway characteristics, driver behavior and vehicle performance. With this information the traffic engineers seek to apply their knowledge, not only to the existing highway system, but to those elements planned for the improvement or expansion of that system. Design standards have been developed and are still in the course of growth and expansion seeking to increase, not only mobility, but general highway safety.

For the future, the traffic division seeks to continue the development of plans and policies that will provide dynamic mobility for the traffic using the state's highways. There will continue to be old roads and as more and more vehicles use them the division will develop control features to improve their safety. Hand in hand with this work will go the task of providing for the design of all known and needed safety features in new highways.

Overhead signs near Charter Oak Bridge.

Some Flow Characteristics Of A Three-Lane One-Way Roadway

By Stewart Fischer

Urban Designer, Texas Highway Department, Houston, Texas

THIS study was undertaken to prove or disprove some of the theories put forth concerning the operations of the three-lane one-way roadway. The following examples are illustrative of some of these theories:

1. Three-lane one-way roadways are less efficient than those with two lanes because of a tendency of drivers to wander about.
2. Traffic in the first (or second or third) lane travels the fastest.
3. Most of the traffic uses the first (or second or third) lane.
4. Traffic operations are no different for a three-lane facility than for a two-lane one-way roadway.

Method of Field Work

The data for this report were obtained on the westbound roadway of the Shore Parkway on Long Island, New York. The Parkway is a modern high-type divided six-lane highway carrying only non-commercial traffic. The particular site was chosen because it was located on a long level tangent section, had ample lane widths and lateral clearances, was well lighted, and was located well away from any ramps.

The field data were obtained through the use of an Esterline Angus 20-pen Recorder. Six pens were used for this study with a telegraph key wired into each pen circuit. Three of the pens recorded the passage of vehicles in each lane past a specific location, two recorded the passage of straddling vehicles, and one recorded the time required for vehicles to traverse a known distance between two specific locations.

The field work was planned so as to disturb the normal driving conditions as little as possible. For this reason, it was deemed undesirable to use road tubes or pavement markings of any kind. The equipment and observers were in two automobiles, which were located as far from the pavement edge as possible. This distance was approximately 100 feet.

The pavement on the section of roadway studied has very distinct longitudinal and transverse construction joints, which provided excellent points of reference. One of the transverse construction joints was selected as the reference line for obtaining headways. Each vehicle was recorded by a pen appropriate to the lane the vehicle was in at the instant it crossed the reference line. The headways between succeeding vehicles could then be determined from the paper roll. Two successive transverse construction joints 95 feet apart were used as reference lines to obtain speed. A pen recorded the instant a vehicle crossed the first of the joints and the instant it crossed the second line. The time elapsed between the two recordings was the time required to traverse the 95 feet and thus measured the speed of the vehicle. The lane the vehicle was in was indicated by a coding system with the same key. Only one vehicle was observed for speed at a time, with the vehicles being chosen as randomly as possible. This was done by observing one vehicle through the entire observation zone and then using the next vehicle to approach the zone for the next observation. It is felt that this method of observation resulted in a true random sample of vehicle speeds.

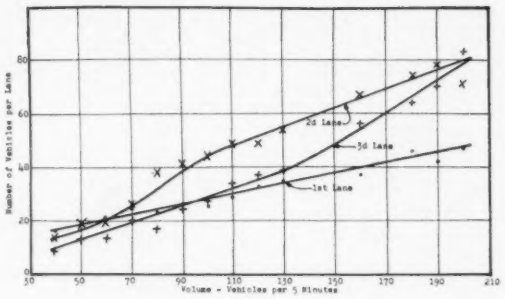


Fig. 1

Graph showing the variation of the number of vehicles using each lane with volume.

The data were obtained in early March, 1951, on a bright clear day. The observations were made during the hours of 8:30 to 11:30 A.M. and 3:00 to 6:00 P.M. These periods were all during the daylight hours although for about the last half-hour, the sodium vapor lights were on.

An investigation of the Parkway, upstream from the study location, revealed that there were no conditions present which should interfere with the normal random flow of traffic.

The data were obtained on a Tuesday so the majority of the drivers, especially during the peak periods, were undoubtedly commuters traveling between their homes and their places of employment, and were probably very familiar with the road.

The Parkway has a 35 mph speed limit and is well patrolled. All passing is to be done to the left, and the second and third lanes are supposedly reserved for passing only.

Method of Analysis

A preliminary investigation of the field data revealed that the best basis of comparison for the flow characteristics was that of volume. The bases of the analysis and the results are, therefore, the variations in volume.

Mr. Fischer was a student at the Yale Bureau of Highway Traffic during the academic year 1950-'51, and this article is based on his student thesis research.

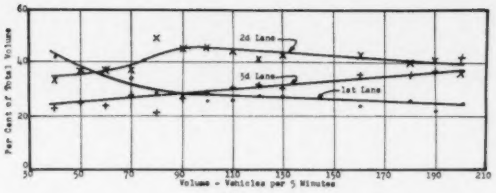


Fig. 2
Graph showing the variation of the per cent of vehicles using each lane with volume.

The first step in the analysis was to divide the mass of data into groups which could be handled and compared. A five-minute period was selected as the basis for comparison because it was convenient to handle and gave a sizeable number of values for comparison. The volumes, as tabulated, are on a "Vehicles per 5 Minutes" basis. If the five-minute volumes are multiplied by 12, the resulting hourly volumes are those that would occur if the five-minute traffic conditions remained constant for an entire hour.

The lane utilization data were obtained by counting the actuations which represented vehicles passing in each lane. The total of the individual lane counts plus the two straddling positions was the total five-minute volume. This study revealed that only about 1 per cent of the vehicles straddled lanes, and for this reason, they were omitted from consideration in either headway or speed determinations.

The analyses of the headway and speed data were carried on together by determining the time intervals between actuations. These values were then tabulated in open-ended frequency distributions with class intervals of 1 second for headways and 0.1 second for speed. A median value for each frequency distribution was determined and recorded along with the five-minute volume. The median value had to be used because of the extremely high range of values encountered, especially in the headways, which ranged as high as 130 seconds.

The five-minute volumes were then arranged in a frequency distribution with class intervals of 10 vehicles per five minutes. The values ranged from 35 to 205 vehicles per five minutes. For each class interval of volume the data for lane utilization, headways, and speeds were collected and the median value of each was determined. These values are presented graphically in Figures 1 through 4.

Limitations of Data

A slight source of disappointment in the data was the low value of the maximum volume. The highest volume recorded in any five-minute period was 205 vehicles. This corresponds to an hourly volume of only 2,460 vehicles per hour, which is less than 60 per cent of the practical capacity of a three-lane roadway. The Shore Parkway is a new facility and carries much less traffic in March than during the summer months.

Lane Utilization

Figure 1, showing the variation of the number of vehicles in each lane with total volume, indicates some very interesting occurrences. The abrupt rise in the number of vehicles in the second lane between volumes of 70 and 100 vehicles indicates that these might be critical values. This seems to indicate that, within this range of values, the flow characteristics in the first lane have become so unsatisfactory, in comparison to those of the other two lanes that a number of drivers overcome their natural inertia and change lanes. The flow characteristics then seem to equalize until a volume of about 130 vehicles is reached. At this volume, the third lane apparently becomes the most attractive and more of the vehicles begin driving in that lane. The volume at which the increase takes place in the second lane is about 10 per cent of practical capacity at 40 mph. The third lane increase occurs at about 20 per cent of practical capacity.

An investigation was made to try to determine some reason for these abrupt rises in lane utilization. Cumulative curves were drawn for both speed and headway for each of the volume groups in the ranges where the rises took place. These curves showed that there was no difference in either speed or headway characteristics that were not attributable to the changes in volume.

The most probable solution for this occurrence lies in the fact that the first lane is the slowest lane. It may be that the drivers are afraid they will be trapped in the slow lane and attempt to get into a faster lane where their movements are not so restricted.

While the curve for variation in the number of vehicles in the third lane is drawn as an ascending curve, there seems to be some indication that this curve will flatten out in the same manner as the curve for the second lane and continue roughly parallel to it. An investigation of the median headway curves (Figure 3) seems to substantiate the plausibility of such an assumption. The headways in the second and third lanes reach the same values at the maximum observed volume and seem to continue together. This would indicate that any further increases in lane volumes for the second and third lanes would occur at about the same rate.

These phenomena shown by Figure 1 are also indicated to a lesser degree in Figure 2, showing the distribution of total volume by per cent. This figure shows the abrupt rise in the second lane usage, but the third lane increase is too gradual to be shown. This figure shows that for increases in total volume above approximately 100 vehicles per five minutes, the first and second lane volumes are increasing at a lesser rate than the total volume increases. Most of the increase occurs in the third lane, and it is reasonable to assume that this will continue long after the third lane is

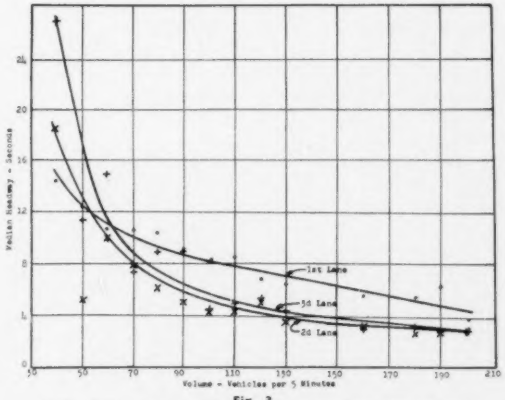


Fig. 3
Graph showing the variation of median headway with volume.

carrying more traffic than either the first or second lanes. On the basis of this assumption, it appears that the percentage distribution stabilizes near the maximum observed volumes. These stabilized percentage values seem to be approximately 40 per cent for each of the second and third lanes and 20 per cent for the first lane.

The *Highway Capacity Manual*[1] shows that this stabilization also takes place on two-lane one-way roadways. The stabilized values for the two-lane roadway are about 40 per cent in the first lane and 60 per cent in the second lane. At comparable volumes, 40 per cent of the traffic is found in the first lane of the two-lane roadway as compared to 20 per cent for the three-lane facility. This shows that only about one-half of the vehicles in the first lane of the two-lane roadway are found in the first lane of the three-lane roadway. For this reason, it is easier to enter or leave the three-lane one-way roadway.

The only means of comparing the efficiencies of the two- and three-lane roadways would be on a capacity per lane basis. The volumes of traffic studied were far too small to indicate the lane capacity of a three-lane roadway. For that reason, no comparison of the efficiencies can be made.

This study does not give any reliable results that prove or disprove the contention that drivers tend to wander about on a three-lane one-way roadway, but it was observed that less than one per cent of the vehicles straddled lanes at the point of study.

Headways

The headway characteristics that were observed were about the same as anticipated. The headways decreased as the volumes increased, and the lane carrying the greatest volume had the shortest headways.

An investigation of the field data revealed that, at all volumes observed, the vehicles tended to move in platoons of from five to fifteen vehicles. Within these platoons, the headways were fairly uniform with larger headways between platoons. The data showed that, as the volume increased, the size of the platoons increased and the headways between them decreased. This fact led to the conclusion that any further increase in volume would tend to bring these platoons closer together and finally fuse them into a continuous moving line of vehicles. This conclusion is borne out by the curves showing the variation of median headway with volume. These curves show that the headways are approaching asymptotic values. The asymptote for the second and third lanes appears to be about 2.5 seconds and 3.5 seconds for the first lane. This indicates that any further increases in volume will cause a narrowing of the range of headways rather than a lowering of the median value.

Speed

The observed speed characteristics revealed very conclusively that the median speed was slowest in the first lane and fastest in the third lane. The difference in speed was about two miles per hour between lanes.

A particularly interesting conclusion must be drawn from the median speed curve. This conclusion is that the range of volumes observed had no effect upon the median speed. This finding conflicts with the accepted tenet that speed decreases linearly with increases of volume for roads with a lesser number of lanes.

[1] *Highway Capacity Manual*, Committee on Highway Capacity, Highway Research Board, Washington, D. C., 1950.

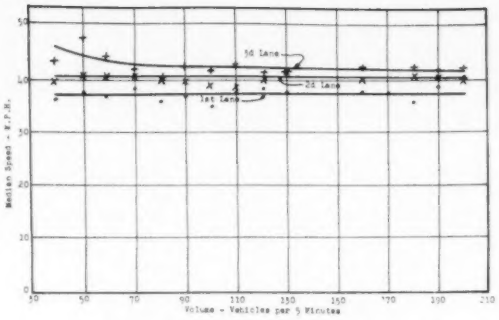


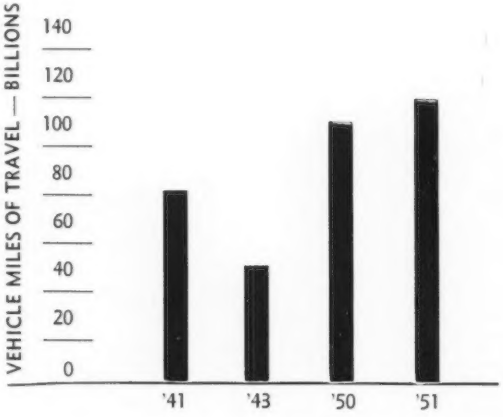
Fig. 4
Graph showing the variation of median speed with volume.

There is apparently some difference in the operating characteristics of a three-lane one-way roadway that negates the effect of volume, up to at least 50 per cent of practical capacity, on speed. From this study, the only difference that is discernible is the provision of extra lane space which provides greater freedom of movement for the drivers.

Conclusions

The conclusions which are drawn from this study are not presented as being comprehensive. They are believed, however, to be indicative of some of the flow characteristics of a three-lane one-way roadway, and they are interesting because the study indicates that some of the characteristics are unique to the three-lane facility.

Traffic Trends



TRAVEL ON RURAL ROADS FOR FIRST SIX MONTHS OF 1941, 1943, 1950 and 1951.

Based on Bureau of Public Roads Data

Traffic Problems Of A District Engineer*

By Jerome Dustin

District Engineer, State Highway Commission of Indiana, Seymour, Indiana

THE District Engineer has available an Assistant District Engineer for Traffic, a very capable individual versed in all the details of traffic generation, movement study, street capacity, parking demand, origin and destination of traffic, basic traffic data, traffic operational techniques, to say nothing of such simple matters as traffic counts, flashers, no passing lines, background reflectorization, obedience lines, traffic signals, school boy patrols and a host of other subjects which could be recited indefinitely. Certainly I know of no easier way to handle the many communications on traffic problems than the addition of a simple notation reading approximately as follows: "George, please investigate and prepare an answer for my signature." Confidentially, even for this purpose I use a mimeograph form which reduces my efforts to the scratching of a couple of check marks and a toss in the out basket. Don't misunderstand me. I read the correspondence and do my best to grasp the problem. A District Engineer must try to acquaint himself with happenings in his district. But these things cannot contribute much to the solution of any particular traffic problem.

What Are Traffic Problems?

It had not previously occurred to me that the District Engineer might have any traffic problems. To prepare this article I thought that my next step ought to be an attempt to define the term "traffic problem." The dictionary defines "traffic" as "the flow of pedestrians and vehicles along a street or highway." It defines the word problem as "anything that is required to be done." Therefore, it might be possible to define the term "traffic problem" as "anything that is required to be done about the flow of pedestrians and vehicles along a street or highway."

The term District Engineer is much harder to define. It is a title which appears to have derived by usage from early days of the state highway organization when construction activities were predominate. It sometimes seems to me that he is more accountant, personnel manager, or errand boy, than engineer.

Incidentally, the dictionary defines the engineer as "one who maneuvers or contrives." A District Engineer certainly does a tremendous amount of maneuvering and contriving these days. It is remarkable how well the definition fits.

I might write about a multitude of items with which traffic engineers are far more familiar than I will ever be. Most of the problems resulting from heavy urban traffic are being continuously studied and frequently reported upon in various technical papers and magazines. These problems require detailed study over considerable periods of time and the District Engineer must necessarily delegate such work to his assistant. So, I shall take this opportunity to point out various problems which from time to time arise to plague the entire district staff—problems not entirely resulting from the flow of traffic but having more or less influence on the safety and convenience of traffic.

First, let me remind you that the present state highway systems, in Indiana and all the other states, were set up in response to a demand for more direct routes and for reliable all-weather pavements for the use of a rapidly increasing number of motor vehicles. The establishment of the state highway system in Indiana can rightly be called an attempt to solve a "traffic problem" and all the operations of the State Highway Commission might be considered as continuing phases of the same attempt.

Disaster Traffic Problems

In my opinion the most serious traffic problems which confront the District Engineer these days are those occasioned by disaster. I am not referring to atomic bombing or other methods of warfare. I am referring to the very serious interruptions to the everyday routine of living and working which result from a breakdown in some important part of the state highway system. If any District Engineer entertains the slightest doubt about the importance of the least bit of state road in his district, he has but to close that road and his telephone will immediately disillusion him.

It is my opinion that I am speaking for every District Engineer in Indiana and in every other state, when I say that the worst *bugaboo* we face is the loss of a bridge. Whether the loss results from a flood or other natural disaster, or from the actions of the reckless, irresponsible and often drunken driver of a highway vehicle, the ensuing uproar and confusion is indeed a nightmare, and the amount of traffic affected by such a disaster serves as a direct gauge of the intensity of the nightmare.

Most people can understand the disabling or collapse of a bridge due to flood waters and are resigned to a certain amount of inconvenience for a limited period of time. But they actively resent the wanton destruction of a bridge by a reckless or drunken driver and through some peculiar mental processes, a good part of this resentment is transferred to the highway department when we are not able to re-open the bridge at once.

When a bridge is disabled or destroyed, the District Engineer is faced with two major traffic problems. He must immediately provide another route or routes to which he can safely transfer both the volume of traffic and the weight of individual loads accustomed to crossing the bridge. At the same time, he must make the basic decision as to what procedure is to be followed in repairing or reconstructing the bridge. The length and condition of available detours will have great influence on the manner and speed of repairs or replacement, and the latter may easily determine the selection of a detour route.

Most of us can remember the time when the only consideration in selecting a detour was the determination of the shortest available route over local country roads. Even when such roads were not surfaced they could quickly and easily be improved, by grading and the addition of a small

*Taken from paper delivered by Mr. Dustin at the 37th Annual Road School, Purdue University.

amount of aggregate, to the point where they would sustain the state highway traffic for an indefinite period of time. Many people still think detours can be selected on the same basis. Only those maintenance employees who have had the bitter experience of attempting to maintain the flow of modern traffic over thinly surfaced local roads and narrow, weak bridges can adequately express the difficulties of this course. If the weather is wet, they are besieged with complaints about mud. If the weather is dry, they are still besieged with compaints—this time about the dust.

The realities of present day traffic usually demand that state highway detours be routed over other state highways of comparable capacity and load carrying ability. A detour capable of carrying the traffic will often be two or three times the length of the road it replaces. Preparation and erection of the necessary directional and informational signs is a major problem in itself—and an expensive one. Protection of traffic at the scene is also a major problem. Standard warnings, barricades, and lights are not sufficient. We usually find it necessary to provide flagmen 24 hours a day for several days and to place in the approach some obstruction which cannot be readily moved. We have found that an old grader gives good protection provided it is chained to the handrail or guard rail on each side of the pavement and the chains locked in place. A third major problem is the protection of adjacent and inadequate highways and bridges from their use as unofficial detours. Except for the posting of bridges, such protection must necessarily be a problem for state or local police officers, but the District Engineer will generally need to request their cooperation.

A little over a year ago we had to close a bridge at the west edge of Columbus. Two major highways, Alternate US 31 and IND 46, are routed across this bridge and two other highways, IND 7 and IND 58 terminate not far from the bridge. The bridge had an average daily traffic count of approximately 7,000 vehicles. The nearest adequate stream crossings are near Seymour, 18 miles to the south and near Amity, 14 miles to the north. Here it was necessary to establish two long range detours, one for Alternate US 31 from Seymour over US 50, US 31 and IND 7 to Columbus, and one for IND 46 from Columbus over Alternate US 31, US 31, IND 252 and IND 135 to Nashville. In addition to the usual detour routing, we found it necessary to prepare and erect approximately 50 special informational signs. This work required the time of the sign crews in both the Columbus and Seymour subdistricts for over a week.

A good portion of the traffic using this bridge is comprised of commuters who work in Columbus and live west and south of Columbus. The above detours were of little help to these people and they resorted to the use of county roads and a covered timber bridge approximately three miles northwest of Columbus. In order to make this bridge safe for the greater volume of light vehicles, the county had to make immediate repairs and they were forced to station flagmen at the bridge 24 hours a day to direct alternating one-lane traffic and to prohibit excessive loads—anything heavier than a pickup truck.

Variations on the above problems arise each time it is necessary to close a highway, whether because of a disaster or because of construction or reconstruction of a road or bridge. Reconstruction or resurfacing projects should be planned to proceed with as little interruption to normal traffic as possible. Closing of a heavily traveled road may permit economies in construction, but in my opinion such savings will be more than offset by additional cost of repairs and maintenance to the detour.

Closing of a major state highway will undoubtedly work a hardship on those business establishments which depend on the traffic of that highway for a livelihood. Their petitions, letters, telegrams and phone calls to the Governor, the Highway Commission and members of the legislature cannot help but cause those officials to consider whether or not it was wise to close the road. The burden of a detour rests squarely on the District Engineer and he must be able to defend his action and to prove its necessity both to the general public and to his superiors in his own organization.

Permits

Let us now forget about unpleasant detours and move on to the equally unpleasant multitude of problems grouped together under the word permit. Probably you are all familiar with the following typical quotations from our Highway Laws but I want to repeat them at this time. "No opening shall be made in any highway in the state highway system, or in the right of way of any such highway, or in the roadway of any street or any city or town over which such highway is routed, the maintenance of which street the state highway commission is charged with by law, nor shall any structure or obstruction be placed in any such highway or roadway of any such street without the consent of the state highway commission. No such highway or roadway of such street shall be dug up for laying or placing any pipe, sewer, pole, wire, conduit, track, railway or for any other purpose, and no trees shall be removed from the right-of-way of any such highway, without the written permit of the state highway commission, and then only in accordance with the regulations of said commission, and the work shall be done under the supervision and to the satisfaction of said commission.

"The state highway commission or local authorities having jurisdiction over any public highway and being responsible for the repair and maintenance thereof is authorized upon proper application in writing upon good cause shown to grant permits for transporting heavy vehicles and loads, or other objects, not conforming to the provisions of sections two and eight of this act, whenever in the discretion of any such officer or body the highway or bridge thereon will not be seriously damaged thereby."

Form M-173 "Application for Permit to Cut into State Road" is usually handled entirely by the subdistrict superintendent, but occasionally the District Engineer becomes involved when the proposed cut would interfere with traffic. We find that applicants for this type of permit tend to disregard everything but their own convenience and costs and will frequently appeal directly to the highway commission if their application is rejected because of traffic considerations.

Form M-173-E "Application for a Permit to Construct a Driveway Entrance and Approach" is the permit which most directly concerns traffic. These applications are first approved by the superintendent, but are given a more thorough check in the district office, particularly those applications for drive-in theaters and other commercial establishments are checked by the Assistant District Engineer of Traffic. Here again the District Engineer is not too much involved in the application. His troubles crop out later in

those instances where the applicant has failed to follow the terms of the permit.

Form M-173-F "Application for a Permit to Display Temporary Banners or Decorations Along or Over a State Highway" is not used too much and usually involves only a consideration of head room. However, it is sometimes necessary to insist that the display be temporary and to require assurance that it will be promptly removed.

Form M-173-G "Application for a Permit to Close a State Highway for the purpose of Carnivals, Street Fairs, etc." are filed annually by a surprising number of communities. They now include several soap box derby races and when they interfere with heavily traveled roads, are a source of complaints to the district.

M-173-U "Application for a Permit to Erect Shelter Houses" is substantially a driveway permit and is handled accordingly.

M-180 "Application for a Permit to Construct a New Railroad Crossing or Change Rail Elevation of a Railroad Crossing a State Road" is always a headache for the District Engineer and the District Office because it is almost always necessary to close the road and detour traffic. It is also difficult to get the applicant to submit complete plans and even more difficult to get the owner to keep the crossing in proper repair.

M-193 "Application for Permit to Move a Building over a State Road" is almost entirely a traffic problem since it is always necessary to close all or part of the roadway. It frequently involves a detour. It may involve the District Engineer in trouble with property owners along the route of the move unless it is clearly understood that the permit to move the house does not automatically grant permission to cut back any and all trees along the route.

M-233 "Application for Permit to Transport Oversize or Overweight Vehicles and Objects over the State Highways" may present a variety of problems. Applications for overloads must be judged by the route proposed for travel, taking into consideration the conditions of the surface, the capacity of the bridges and at certain seasons of the year, the condition of the subgrade. Frequently an alternate route can be suggested. Overwidth loads involve the use of flagmen and other measures to protect normal traffic. Overheight permits may require rerouting to avoid bridges and underpasses. The District Engineer is expected to be ready to make recommendations on these matters at all times.

Snow and Ice

Wintertime snow and ice conditions present a variety of traffic problems which are primarily the responsibility of the Assistant District Engineer of Maintenance and the Sub-district Superintendents but when conditions are severe the District Engineer may be called on for help. Of course the removal of snow and ice is entirely a traffic problem. No traffic—no need to clear the pavement. When it snows present-day traffic demands two things of the state highway department. The continuous and uninterrupted use of the highways and detailed information on the condition of the highways. Anyone who has ever had close contact with snow and ice removal operations will tell you that their work would be much simpler and easier if all traffic could be kept off of the highways until the storm had ceased and maintenance workers had had a few hours time to clear or treat the pavement. In the hilly country maintenance crews are continually hampered by trucks which attempt to travel as usual, stall on the first slick hill, jackknife and block the highwaly so that even the snow plows cannot bet by until the truck can be pulled out of the way.

Accurate information on road conditions is equally difficult to secure and furnish to callers. Roads may be open, completely blocked, and open to traffic again in a matter of a few minutes. Basic information must come from workers who are making strenuous efforts to keep traffic moving and who do not have access to a phone for long periods of time.

Many other maintenance operations are heavily affected by traffic. Perhaps you are not aware that one of the main reasons maintenance employees work only five days a week is that it is too hazardous for them to try to work under Saturday traffic conditions. The same restriction applies to holidays.

From time to time the Districts are asked to submit programs for new construction and for rehabilitation of existing roadways. Recommendations are based on field inspections and on maintenance performance records of course, but priority is assigned almost without exception on the basis of volume of traffic.

Every Problem Is a Traffic Problem

No one aware of the facts of life can ignore the demands that heavy traffic make on the time and efforts of highway employees. No one can watch the mushroom villages spring up along our highways and not realize the tremendous effect this same traffic can have on a local community.

Every highway problem, every problem of the District Engineer, is a traffic problem. The work of a District Engineer is not as gloomy as this article portrays. After all, there are occasional warm, sunshiny days when he can throw down his pen, drive out to a remote corner of his district and tramp in the mud of a new grade or sniff the fragrant odor of fresh asphalt. Who can ask for more.

Positions Available

Traffic Engineer—City of Fresno, California

The City Commission of Fresno, population approximately 100,000, invites applications for position of Traffic Engineer. Please give full particulars in first letter as to references, training, and experience.

Salary is open.

For further information, please write to

CITY CLERK D. E. ROUGHTON
New City Hall
2326 Fresno Street, Fresno, California

Traffic Engineer—State of Georgia

Applications for the position of Traffic Engineer, State of Georgia, are invited. The Traffic Engineer is under the Highway Planning Division with an official title of Assistant Highway Planning Engineer.

Qualifications should include some city traffic experience; a degree in Civil Engineering and special training desirable.

Starting salary is $400.00 to $500.00 per month. Further information can be obtained by writing to:

ROY A. FLYNT
State Highway Planning Engineer
Georgia Department of Highways
No. 2 Capitol Square, Atlanta, Georgia

Freeway Construction In Los Angeles

Digested from article by W. L. Fahey, Dist. Eng., Calif. Div. of Highways, which appeared in the May-June 1951 issue of "California Highways and Public Works."

THE Hollywood Freeway has been referred to as the "backbone" of the Los Angeles Metropolitan Freeway System. It is a part of U. S. Highway 101, which through the Los Angeles Civic Center is called the "Santa Ana Freeway" from the center line of Spring Street easterly, while from this point westerly it has been given the glamorous title of "Hollywood Freeway."

At no time since construction first started on the Hollywood Freeway in 1939 when the City of Los Angeles advertised and awarded a contract for the eight-lane freeway through Cahuenga Pass, has there been so much and so varied construction in progress as at the present time. The State Division of Highways now has active construction under way on 17 contracts. These contracts cover grade separation bridges, storm drains, sanitary sewers, grading and paving, safety lighting and signing, and landscaping. The estimated total construction cost of these projects exceeds $9,000,000.

Construction is now in progress on the section from Los Angeles Street to Grand Avenue, for grading and paving under the previously constructed overcrossing grade separation bridges. From Broadway to Grand Avenue the excavation cuts averaging 50 feet in depth were brought down with 1½:1 side slopes. From Los Angeles Street to Broadway the main freeway roadways are being enclosed by counter-fort type reinforced concrete retaining walls 30 feet high. Outside of these walls will be built outer highways connecting with the existing city streets.

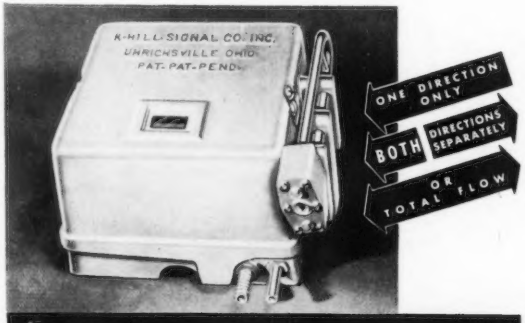
Outlet ramps will transfer traffic eastbound from the freeway to Grand Avenue, Broadway, Spring Street, Main Street and Los Angeles Street; and westbound traffic to Spring Street. Inlet ramps to the freeway will provide access for traffic from Alameda Street, Los Angeles Street, Broadway and Grand Avenue. The contract is now 38 per cent complete. It is expected that this section of the freeway will be completed by December 15, 1951.

Traffic is now utilizing the top of the four-level grade separation interchange structure and moving over the completed portion of the Hollywood Freeway between Grand Avenue and Virgil Avenue. Westerly from Virgil Avenue the 1¾-mile section to Western Avenue is now being paved and completion is expected by October 15, 1951.

The pavement on the freeway is Portland cement concrete, eight inches in thickness. This is placed upon an eight-inch layer of disintegrated granite, the top four inches of which is treated with 3½ per cent Portland cement. This layer in turn is placed upon an eight-inch thickness of selected subbase material of relatively high bearing value. The source of the disintegrated granite is a location on Los Angeles City-owned land where it can be obtained free of royalty cost. The subbase material came from Fort Moore Hill excavation that had previously been selected and stockpiled for this purpose. Thus high quality material to provide suitable foundation for the Portland cement concrete pavement, making the total structural design 24 inches in thickness to support the modern heavy traffic loads, was obtained at a much lower cost than if all of this material had had to be obtained from commercial sources.

Since the excavation work started on Fort Moore Hill over two years ago treasure hunters with imaginations fired by the exploits of the conquistadores have been eagerly haunting the construction area between Broadway and Grand Avenue. The power shovels have exposed bones and coffins at the site of the old French Cemetery, and bottles and utensils bearing marks of antiquity, but, alack and alas, no gold.

The budget for the 1951-52 fiscal year includes funds so that subsequent construction contracts can be advertised and let to complete the Hollywood Freeway. The construction schedule calls for a completion of the Hollywood Freeway throughout its entire length, from the Los Angeles Civic Center to Vineland Avenue, a distance of 10 miles, by the end of 1953.



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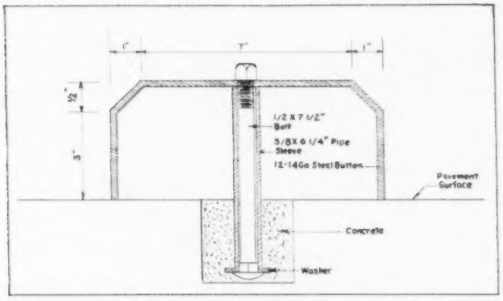
Reference Notes

Channelization

By Cooper McEachern (Jun. Mem., ITE)
Assistant Traffic Engineer, Houston, Texas

THE accompanying illustration depicts a simple and effective method of intersection channelization that requires a minimum amount of time and labor with little cost involved. The "buttons" are stamped from discarded metal signs, 12 and 14 guage, at a cost of seventy-five cents each. The total labor and material costs, in conjunction with the installation of one button, is less than would be required to install one traffic sign post.



To insure proper night visibility, holes are drilled in the sides of the buttons and ⅞ inch crystal reflectors are inserted.

These traffic markers, or buttons, have been in service in Houston for almost a year at some locations, and expect for occasional re-painting of the buttons and replacement of the reflectors there has been little maintenance required.

The edge of the button that is in contact with the pavement surface is sharp and will penetrate a bituminous surface, thereby reducing the possibility of any shifting or sliding. If the surface of the area to be channelized is concrete, the button may be filled with concrete to minimize the possibility of shifting.

Effective Signing of "Peak Hour" Parking Prohibitions In Parking Meter Zones

IN attempting to effect restrictions on curb parking in parking meter zones during the peak hours of traffic flow, it was found that individual signing of each parking meter was necessary to obviate any misunderstanding. To accomplish this purpose excellent success was obtained with the use of decals.

Our experience has shown that for this usage the varnish applied decal is far superior to the "slide-off" water application type. Three months ago, the varnish type decals were applied to 350 parking meter standards and to date replacements have been less than one per cent. These few losses could all be attributed to vandalism.

The cost of the decals is nominal ($0.15 per copy) and they are easily installed. Since all of the parking meter standards in Houston are galvanized pipe it was found that the following application procedure was necessary for proper adhesion:

1. Clean the surface of the pipe with a solvent sufficient to remove all excess foreign matter.
2. Apply a thick coat of galvanized iron primer to the surface.
3. When the prime coat has dried mount the decal into position.

(Continued from page 402)

town businessman provided parking facilities wherever possible, both in lots and garages. The demand for parking made the commercially operated parking lot a successful venture. Reasonable parking rates with proper turnover allow a return on the property valuation in most cases.

On the other hand, the high valuation of buildings in the area has in many cases resulted in unprofitable operation of such buildings. There has therefore been a strong trend toward removal of major and minor buildings, with the land being used for parking. Because of these conditions, there are today 42,000 offstreet parking spaces in and adjacent to the Central Traffic District. Over 2,000 of these spaces have been recently added by the demolition of buildings in the Civic Center area.

The City of Los Angeles has therefore never been required to invest a single dollar in the development of offstreet parking facilities except for those adjacent to public buildings. There are cases, however, in which the city is required to aid, although not financially. The most striking of these was the development of the Pershing Square Underground Garage. This facility, with an 1800-car capacity, is now under construction.

The zoning law of Los Angeles has had a pronounced influence upon the provision of offstreet parking facilities. In connection with commercial structures, it requires that one parking space must be provided for every 1,000 square feet in excess of 7,000 square feet, and that one space be provided for every 10 seats in theatres, stadiae, churches and other places of public assemblage. This ordinance became effective in June of 1946, in time to affect the very large scale building which has been carried out since that time. Application of the ordinance has resulted in the construction of a major garage in the Central Traffic District and the provision of parking lots with capacities of from 3,000 to 6,000 cars in connection with the construction of shopping centers, including department stores. As a matter of interest, it may be noted that every chain market and many of the chain drug stores provide offstreet parking facilities for each store, as a matter of policy.

A certain limited problem does remain, however, principally in those outlying communities which were developed during the 20's and early 30's. There is an insufficiency of parking facilities in many of these areas, due principally to the fact that they consist largely of concentrations of small businesses, each independently unable to acquire the capital

necessary for the development of parking facilities through the removal of adjacent buildings. It is for this reason that the city has adopted the use of parking meters, which are now in operation in two such areas. The parking meters have been highly successful and it is anticipated that the revenues will be sufficient to progressively provide parking facilities in these areas. Requests for similar installations of parking meters have been received from other parts of the city, for the same reason.

In Conclusion

Traffic engineering in Los Angeles is today in the highest stage of its development. There is a single commission and department charged with the responsibility of traffic engineering, with direct control over installation and maintenance of signs, signals, markings, parking meters and other matters. The department also acts extensively in an advisory capacity in the field of roadway design and works directly in the continual review and strengthening of traffic ordinances. Although there are a number of individual problems which remain unsolved, it is clear that traffic engineering in this city is now out of the woods of divided jurisdiction, split responsibilities and mass resistance to large scale use of effective traffic control methods. Much remains to be done and little by little, it is being accomplished.

PERIOD COUNTER

The Period Control Traficounter (model PC) is a portable, automatic counter designed for use with a pneumatic type road tube. The special feature of this model is its ability to receive counts during any portion or period of the day.

It may be turned on and off automatically at predetermined intervals. Thus a set of *Period Control Traficounters* may be correlated by a single operator and readings taken at any convenient time.

The Period Counter is made to give only one count for every two vehicle axles to pass over the road tube.

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TRAFFIC NEWS

National Research Body To Study Impact of Parking Shortage on Retail Business

The parking problem will be diagnosed for the first time in its relation to the economic health of communities, retail business and motor vehicle use in a broad-gauge study being undertaken by the Highway Research Board of the National Academy of Sciences.

The many-sided survey is designed to supply factual answers to such questions as the effect of offstreet parking shortage on downtown property values and taxes; on volume of trade in the business center; on street congestion; and on the full use of the family car. It also will seek to determine whether sufficient offstreet parking at moderate cost can be provided to satisfy the demand, and how such facilities can best be financed.

Funds for the research have been made available by the petroleum and automotive industries through the Automotive Safety Foundation. It is estimated that $75,000 will be required for the two-year project.

At the request of the Foundation, the Highway Research Board agreed to direct the survey, with specific phases of the research to be carried out at three or four selected University Schools of Business Administration. Contracts with the institutions, to be chosen regionally, will provide for the engagement of requisite faculty members and graduate students on a fellowship basis. Actual research is expected to begin this Fall. A staff engineer loaned by the U. S. Bureau of Public Roads will correlate the research at the selected Universities.

The Board has established an Advisory Committee, composed of representatives of business, property owners, industry, highway users and government, to give practical guidance to the project. The Committee held its organizing session in Washington recently.

As background for the Highway Research Board study, pertinent data on parking needs and current practices will be available from some 60 completed city parking surveys conducted jointly by the municipalities, state highway departments and the Bureau of Public Roads. Retail trade data will be forthcoming through the business interests represented on the Advisory Committee and established contacts of the selected Schools of Business Administration.

The Highway Research Board will issue interim reports as the research progresses and a rather complete report at the end of the first year. Then at the conclusion of the two-year period a composite report consolidating the overall research activity will be prepared.

Parking

Statistics gathered for the 1951 Municipal Year Book show that 450 cities with over 10,000 population now own and operate parking lots, and that five cities operate public-parking garages.

The North Carolina legislature gave authority to its municipalities to set up parking authorities empowered to provide off-street parking, including municipal parking buildings.

Philadelphia, Pa., recently ordered 15,000 automatic-type meters. This current order, together with 770 dual meters previously installed, undoubtedly will give Philadelphia the world's largest parking meter system.

Miami Beach, Florida, has purchased property valued at $119,800 for parking lot purposes. In the meantime, a survey is to be made which will result in the construction of multi-deck public garages.

Because of a recent ruling barring big trucks from New York's garment area during most of the day, plans are being made for a $300,000 terminal for huge long-distance trailer trucks. The terminal will contain fifty parking slots for trucks up to fifty feet long.

Oklahoma Toll Road Will Carry 28,000 Pound Axle Loads

The Oklahoma Turnpike Authority has announced that the Oklahoma City-Tulsa toll road will be built to give good service for at least 40 years and to carry an axle load of 28,000 pounds. The Authority agreed to build a 16.5-inch base regardless of the type of surfacing to be used and has approved five types of surfacing specifications, two cement and three asphalt. Meanwhile, Governor Johnston Murray is contemplating a road bond issue of as much as $100,000,000 to replace inadequate bridges and "death traps" on Oklahoma highways. He has asked state highway director, C. A. Stodlt and the Highway Commission to compile a report on the necessary projects and the cost.

Motor Vehicle Travel On Rural Roads Reaches New All-Time High

The Bureau of Public Roads reports an estimated total of 223,000,000,000 vehicle-miles of travel outside of cities last year—an increase of 8.7 per cent compared to 1949. In previous years, travel on city streets has just about equaled that on rural roads. Total travel on all roads and streets was probably close to 450,000,000,000 vehicle-miles last year.

N. Y. Motor Vehicle Financial Responsibility Law Changed

New York has revised its financial responsibility law to increase insurance coverage from $5/10,000 to $10/20,000. If an accident occurs in which property damage exceeds $50.00, or if there is personal injury, persons involved, regardless of fault, are required to file sufficient security to satisfy any judgment that might result.

Committee on Highway Safety Research

A new Committee, on Highway Research, has been set up by the National Research Council as the result of recommendations by the Advisory Group on Highway Safety Research of the President's Highway Safety Conference of 1949, and of a request from President Truman to the Academy-Council to assist in the implementation of a research program.

The purpose of the committee is to carry on cooperative planning studies and to encourage and correlate research of other research agencies on the basic causes underlying accidents on the highways. The emphasis will be on the field of human capacities, attitudes and behavior of drivers and pedestrians as related to physical characteristics of the vehicle and the highway. For this reason, the committee has been set up to include representatives of various fields of science that may bear on highway safety research, reports directly to the National Research Council and will correlate highway safety interests throughout all Divisions of the Council.

Chairman of the committee is Dr. E. R. Hilgard, Dean of the Graduate Division and Professor of Psychology, Stanford University. The committee membership is at present largely ex-officio, consisting of the chairmen of appropriate N.R.C. and Dept. of Defense committees. Members at large are Mr. Sidney Williams (Hon. Mem., ITE) of the National Safety Council, and Mr. Rudolph F. King, Registrar of Motor Vehicles of Massachusetts. Mr. Williams and Mr. King both have been recipients of the David Beecroft Memorial Award of the Society of Automotive Engineers for distinguished contributions to highway safety.

Through the interest and support of Commissioner Thomas H. MacDonald (Hon. Mem., ITE) of the Bureau of Public Roads, another recipient of the David Beecroft Award, it has been possible to initiate operations of this new committee and to employ a full-time Executive Secretary. In order to take on this assignment, Dr. T. W. FORBES (Assoc. Mem., ITE), Visiting Associate Professor of Engineer and Psychology, University of California, Los Angles, has been granted further leave by the University of Hawaii where he has been chairman of the department and Associate Professor of Psychology.

The present members of the committee in addition to the chairman and executive secretary are:

Dr. Meredith P. Crawford, Dean of the Junior College, Vanderbilt University; Chairman, Committee on Aviation Psychology, NRC.

Mr. Rudolph F. King, Registrar of Motor Vehicles, Commonwealth of Massachusetts.

Dr. W. M. Krogmon, Graduate School of Medicine, University of Pennsylvania; Chairman, Committee on Physical Anthropology, NRC.

Dr. C. D. Leake, Vice-President, Medical Branch, University of Texas; Chairman, Committee on Problems of Alcohol, NRC.

Dr. H. C. Levinson, Alewife Farm, Kennebunk, Maine; Chairman, Committee on Operation Research, NRC.

Dr. Colin M. MacLeod, Medical School, New York University; Chairman, Armed Forces Epedemiological Board.

Dr. Donald G. Marquis, Chairman, Dept. of Psychology, University of Michigan; Chairman, Armed Forces-NRC Vision Committee.

Dr. R. A. Moyer, Institute of Transportation and Traffic Engineering, University of California, Berkeley; Chairman, Highway Research Board, NRC.

Mr. Sidney Williams, Assistant to the President, National Safety Council.

The Committee held the first meeting in Washington in conjunction with the President's Hwy. Safety Conference.

Toll Road Planning Gets Underway in Indiana

Indiana highway officials are making preliminary plans for a toll road across northern Indiana to connect with Ohio's toll road. Samuel C. Hadden, Chairman of the State Highway Commission, has said that he wanted a ruling on constitutionality of the 1951 toll road law before definite plans are completed.

Special Lighting for Jersey Turnpike

Motorists who stop for gasoline or food along New Jersey's 118-mile Turnpike after dark will enjoy special lighting produced by fluorescent mercury lamps.

Authorities of the New Jersey Turnpike disclosed today that 289 of these lamps will light the service areas on the toll road and its administration building area in East Brunswick. Ninety-two standard mercury lamps will light the traffic interchanges where vehicles enter or leave the Turnpike.

Westinghouse Electric is furnishing the lamps and the new football-shaped overhanging units which hold them, together with the required transformer and electrical controls at a cost of $90,000.

Lines of three New Jersey utility companies, Public Service Electric & Gas Co., the Atlantic City Electric Co. and the Jersey Central Power and Light Co. will furnish the electric power for the lighting.

The fluorescent mercury lamps were developed recently. They contain a special new phosphor and the lamps retain the high efficiency of mercury vapor but produce a more flattering color of golden white light than do regular mercury lamps.

Their installation along the Turnpike's four-to-six lane route from Deepwater, in Salem County, where the highway will connect directly with the Delaware Memorial Bridge, to Ridgefield Park (Route 6), in Bergen County, adjacent to the George Washington Bridge, will be their most extensive use thus far.

Barring unforeseeable delays in the procurement of construction materials, manpower and equipment, and with seasonable weather conditions, the schedule calls for opening in November of this year of 107.7 miles of the Turnpike south of the Raymond Boulevard interchange in Newark, and 4.5 miles north of the Lincoln Tunnel connection. Difficulties in shop-engineering incident to the fabrication of steel for bridges crossing the Hackensack and Passaic Rivers will cause a delay in the opening of a six-mile section between the Lincoln Tunnel and Raymond Boulevard, in Newark, until the early part of January, 1952.

First Pan American Convention of I. R. F. to Be Held in Lima, Peru

The First Pan American Convention of the International Road Federation will be held in the Municipal Palace of Lima, October 5 and 6, just prior to the opening of the Fifth Pan American Highway Congress.

Representatives of International Road Federation affiliates from most of the Republics of the Western Hemisphere will attend both the IRF convention and sessions of the highway congress.

Principal purpose of the IRF convention is to bring together at the same time as the Fifth Pan American Highway Congress representatives of all Western Hemisphere affiliates. These include national road associations in Mexico, Brazil, Peru, Bolivia, Chile, Ecuador, Cuba, Colombia, Uruguay, Guatemala and Canada, as well as provisional road groups in Panama, El Salvador, Costa Rica, Nicaragua and the Argentine.

The highlights of the IRF convention will be a round-table discussion of current highway association activities; a review of the Mexican Rural Roads program promoted by Asociación Mexicana de Caminos; a discussion of the highway associations' part in the development of the Pan American Highway, and a dissertation on the U. S. Technical Cooperation Administration program for aiding the development of highways and highway transportation in the Latin-American Republics.

Illinois Highway Users Conference to Publish Uniform Laws Study

The Illinois Highway Users Conference, as a public service, is proceeding to publish a summary of the comparison of four acts of the Uniform Code with Illinois motor vehicle laws and a complete comparison of Act V, "Rules of the Road" section. The study was made several years ago but has been left unpublicized since its completion. The highway needs report of the Illinois Division of Highways and the highway program of the Illinois State Chamber of Commerce were reviewed and studied at a recent meeting of the Illinois Conference. It was generally agreed that Point 9 of the Chamber road program, dealing with the prohibition of highway funds diversion, would receive the support of the Conference membership.

New Chamber of Commerce Committee Established

A broad representation is shown in the composition of the 1951-52 Transportation and Communications Committee of the Chamber of Commerce of the United States, made public by the Chamber recently.

The 35-man committee, which will guide the operations of the Chamber's Transportation and Communication Department, as well as study and recommend policy, contains a balance of interests. Air, highway, rail and water carriers are represented, along with shippers, the telephone, and telegraph industries, and the general public.

Evans A. Nash, of Oklahoma City, a member of the Chamber's board of directors, renamed chairman, said of the committee's plans for the coming Chamber year: "One of our most important tasks will be the re-examination of Chamber over-all policies in the domestic and international transport fields. Special subcommittees will be appointed for one or both of these projects and will include representation from outside the membership of the committee, so as to do the best possible job. We expect to make good use of suggestions offered at our recent regional transportation conference in Oklahoma City and Atlanta in our policy review work, as well as in consideration of other current problems."

The first meeting of the committee is scheduled for early in September.

Fourth Quarter Passenger Car Production Discussed by NPA

The National Production Authority has asked the passenger car manufacturing industry to estimate the amount of controlled materials it will need for production of approximately 1,200,000 passenger cars during the fourth quarter of 1951. This is about the same number scheduled for manufacture in the third quarter. NPA said two major decisions remained to be made before fourth quarter production can be determined definitely: (1) Whether passenger car production will be included under CMP and (2) whether the third quarter rate of production is enough, too much or too little when compared with other essential programs and the availability of scarce materials.

Paul Green, (Mem., ITE), Chief Engineer of Eastern Industries' Traffic Signal Division, Norwalk, Connecticut, explains the functions of the Company's speed meter during a television interview by Jean O' Brien of WNHC's television staff in New Haven, where the firm's executive offices are also located.

The so-called Doppler effect, consisting in the change in frequency of waves emitted by an approaching or receding source, is a familiar phenomenon in the field of acoustics. Everyone has noticed how the aggressive high-pitched honk of an approaching, fast-driven car goes into a much lower departing tune as the car passes by.

In optics the same effect will make the light of an approaching source look bluer, and that of a receding source redder, than it actually is. There is a story of how this Doppler effect in optics almost saved the famous American physicist, R. W. Wood, from paying the usual fine for crossing an intersection on a red light. The story goes that, being summoned to the traffic court with the violation ticket, Professor Wood gave a brilliant (as usual) lecture to the judge on the subject of the Doppler effect, explaining how and why one can see a red light as green if one drives towards it. But, while the judge was highly impressed by that presentation, and was ready to waive the fine, one of Wood's students (recently flunked by him on an optics examination) happened to be in the courtroom and proposed that the judge ask the professor to estimate the velocity with which he must have been driving in order to see the red light as green. As a result, the fine was changed from that for crossing on a red light to that for exceeding the speed limit of the city of Baltimore.—*American Scientist, July 1951.*

Secretary's Column

Perhaps many of us have not had occasion to consider the great amount of work and responsibility connected with the planning and execution of our Annual Meetings. Annual Meetings are big business when we consider the many thousands of dollars involved in housing, feeding, and entertaining a convention. The amount of detail to be handled is tremendous. It ranges from blackboards to special trains. As to responsibility — reservation guarantees must be made and the "stakes are high."

Your headquarters' office deserves very little credit for Annual Meetings. With the exception of much advice and some paper work, the whole burden is on the shoulders of the Local Committees. In return, a few thanks are offered to the committees and some criticisms, but, mostly, the reward is the satifaction of a contribution to the field of highway traffic.

The *Institute* is greatly indebted to all committee members who contribute their time and ability to the work of the *Institute*. On behalf of the Officers, and the entire membership, they are to be commended for their unselfish and untiring efforts to accomplish the objectives of our organization.

This issue of "Traffic Engineering" marks the month of the 22nd Annual Meeting of the *Institute*. Our "hats are off" to those who have contributed to the meeting, who are taking part in the program, and who have worked throughout the year to accomplish the achievements which will be reported at the meeting.

Fred W. Hurd

SECTION NEWS

Florida Section

Walter Gottschalk, Earl J. Reeder, Edmund Friedman, George Kunde and W. E. Ducker had a little "get together" luncheon at the Hotel McAllister recently. As the dining room was air-conditioned and the food and company both excellent, a good time was had by all.

George Kunde is now with the firm of Rader Engineering Company, Dupont Building, Miami, with Earl J. Reeder.

Walter O. Gottschalk is now a "star" salesman with Minnesota Mining Company.

Reported by Walter E. Ducker
Secretary-Treasurer

Western Section

Al Head (just call me Junior) is in a bad state of retrogression having decided to live his life backwards. Head is in the waning throes of a severe attack of Chicken Pox. Most recent bulletin indicates he is over the worst and currently in the scratching stage. This juvenile malady is his excuse for not having taken a bath for two weeks, in lieu of which he has had an occasional "once over lightly" with a vacuum cleaner.

Bill Brandes, ITE member in Teague, Texas, would like to recommend a project for the Western Section members, as follows:

"Institute an exhaustive study to determine *where* and *how* that honorable salesman, Mr. W. E. (Skinny) De Young lost his set of 'uppers' in Dallas, Texas, on or about July 28, 1951. As a first step it is suggested clues might be found among Assistant Managers, housekeepers, bell hops and especially the force of plumbers, all employed by Hotel Adolphus in said city of Dallas.

"As a second phase of this same project it would be of interest to determine just how said set of 'uppers' were recouped finally near a place called Rosebud.

"Herein lies a mystery requiring the best research minds obtainable. From this vantage point of Teague, Texas, the project should attract interest on at least a nation-wide scope. Presentation of the final project report would be very appropo on about September 24 in Los Angeles, California. Of course, any preliminary report prior to that date woud be helpful."

The Annual Meeting of the Western Section will be held Monday morning, September 24, at 10:00 A.M. at the Ambassador Hotel (exact room to be announced later). The following subjects are tentatively on the agenda:

1. Report of Secretary-Treasurer
2. Canvassing the ballots on election of officers
3. Location of Annual Meeting—1952
4. Discussion of Western Section responsibilities at the 22nd Annual Meeting, to include some working assignments for Western Section members to pitch in and make the 22nd Annual Meeting a real success
5. What happened to whose teeth, and where?

Stuart Bate and the Los Angeles Metropolitan Traffic Association, in the April-May issue of TRAFFIC, have presented some of the results of a series of studies by the Association, concerned primarily with the organization of the administrative officials of the municipalities within the Los Angeles Metropolitan Area into a Metropolitan Transportation Engineering Board whose purpose is to expedite construction of the freeway system. This is a very interesting and comprehensive publication and copies can no doubt be obtained directly from Stuart Bate if desired.

When Chuck Haley was in Paul Plutae's office recently, the subject of of Western Section dues came up and he came away with this question—"What do I get for my buck?" At the Annual Meeting in Los Angeles maybe we can find something suitable for Haley's buck. Would you fellows like to have a membership card just to think you're getting your money's worth out of this?

Cliff Clark has confessed that he is not responsible for the work being done on the reorganization of the accident files for Los Angeles County, but that Harold Marks and George Fahey are.

Bob Crommelin is at Fort Belvoir, Virginia, as an instructor in the building of airstrips and roads.

C. Harold Miller, Traffic Engineer of Amarillo, writes: "Thank you very much for placing me on the courtesy mailing list of Westernite. It will be nice to keep up to date on the activities of one of the most progressive sections

in the ITE. Should any Western member be in, or through Amarillo, needless to say he would be most welcome in my office."

Pete Rask of Pasadena is painting his house instead of his center lines.

Lee D. Kies, Assistant Accident Analyst with the Oregon State Highway Department, attended a traffic seminar recently at Northwestern University in Evanston, Illinois. Lee was one of 15 traffic engineers, police officers and army officers from over the country to be in the seminar.

Paul Plutae informs us of an informal luncheon attended by John Caarls, Ralph Burgess, Glenn Smoot and himself. They had just left an all-morning meeting regarding parking, access roads, etc., for the Hughes Plant south of Tucson. It's quite a problem and John Caarls is concerned about it—not so much the situation at the plant itself, but what to do with the estimated 10,000 vehicles when they jam the streets of the Old Pueblo. As a result of this problem and others of a like nature, John is down to a shadow of a shadow, and the temperature isn't helping his appetite, either.

During the luncheon, they discussed the requirements for establishing a chapter—at the table they counted noses and thought they had enough members to form a paragraph, or at least a sentence. It would be called the Greater Tucson, or what have you, and would include Phoenix as a suburb of Tucson for, Caarls, Burgess and Plutae agreed, that is what it really is. Smoot dissented.

Ralph Luckenbach entered the yellow-tail derby in San Diego but the fish he was using for bait swallowed his strike and he was unable to place anything in the prize winning class.

George Howie, Portland, Oregon's ex-assistant traffic engineer and currently Cincinnati's pride and joy, returned to Oregon with his family during the past month for a rather extended vacation. George dropped in the other day and I couldn't tell whether he was embarrassed or sunburned. Upon closer examination, it was found that he had picked up a beautiful sunburn here in Oregon. He reported considerable success with his new position and his staff. Good luck, George, and let us hear from you, for it's always a pleasure to hear when a Westerner makes good in the East.

Wayne Morris of Tucson is in dire straits. Now that Chuck Haley has been admitted, Morris is being reminded frequently to send in his application. He claims it is completed but he doesn't have any stamps. Paul Plutae tried to help him out and the best he could do was a 1½ center, slightly cancelled. Paul thought an appeal in this issue might help. He needs about 12 cents worth.

The Second Annual Western Regional Highway Planning Survey Conference will be held in San Francisco September 20 and 21. Jake Young, Traffic Engineer for the California Division of Highways, is in charge of the program, and Sam Osofsky and Bob Glenn are among members of his steering committee.

G. P. Parmelee of the Auto Club of Southern California, and Glenn Johnson, of the American Gas Accumulator Company, were in for a short visit with Bruce Crandall the first part of the week.

The Traffic Safety Division of the Arizona Highway Department has recently published "Arizona Motor Vehicle Accidents — 1950," presenting among other things an interesting percentage comparison of rural accidents to all accidents.

Glenn Smoot vacationed in Colorado recently. He hoped to see Al Pepper and Hank Barnes while there.

Al Hutchinson and Joe Havenner found enough time last month to take a vacation.

Reported by J. Al. Head
Secretary-Treasurer

Diversion For Toll Road Denied In Maine

The Supreme Court of Maine, in an advisory opinion, declared unconstitutional proposed legislation that would divert part of the gasoline tax revenues to the Main Turnpike Authority for extension of the toll road. A pending bill before the legislature would give the Turnpike Authority six cents of each gallon of gasoline used in travel over the toll road for the purpose of extending it north of Portland. The bill will be amended to empower the State Highway Commission to make "expansion" surveys. It will authorize expenditure of about $500,000 for extension of the toll road from Portland to Lewiston.

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Personalities . . .

J. EDWARD JOHNSTON (Mem., ITE) made his engineering debut with the Nebraska State Highway Department following graduation from the Lincoln High School in 1925. The first two years with the Highway Department were spent in the field on preliminary surveys and construction work. During this time he was advancing from the lowly chainman to that of in-

strumentman and felt that he had reached the *epitome* of his profession.

In the fall of 1927 he transferred to the Lincoln office to work part time and go to the University of Nebraska. In the office he worked on balancing grades, bridge detailing and some design, and drafting of maps and plans.

During the period from 1930 to 1939 his vocation followed the pattern common to most office engineering employees. There was the occasional raise, the two weeks' vacation always taken during the winter time, and the normal eight to twelve, one to five routine on week days, and the anticipated eight to twelve only on Saturdays. This period was notable primarily for his marriage in 1934 to Ruth Landers of Lincoln.

In 1939 an announcement placed on the bulletin board in the main drafting room offering a course of study in traffic engineering at the Yale Bureau of Street Traffic Research, as it was then called, was brought to his attention. A traffic engineering division was established in the Highway Department in 1939. In June of 1940 upon completion of the work at the Bureau, he was employed as Traffic Office Engineer and in January 1941 became Traffic Engineer.

During the war, in addition to being Traffic Engineer, he was also State Zoning Engineer in the interest of comprehensive land zoning adjacent to military bases or war industries.

Since the war he has been active in the organization of a State Safety Council, and was its Executive Director for a time in conjunction with his Traffic Engineering functions; he administered the Council as a part of the traffic organization for two years. He has been the State's representative at all of the President's Highway Safety Conferences, and served a two-year term as Chairman of the Accident Records Committee of the National Safety Council.

Ed's major contribution to the profession of traffic engineering in Nebraska is the educational program which his Department has conducted to encourage the use of uniform warrants in the application of traffic control devices. He has spent more time keeping unwarranted devices out than in the application of additional devices.

The Department over which he is in charge performs nearly all of the functions which an ideal traffic engineering department should perform. The Department furnishes traffic engineering services to any city or village in Nebraska, is consulted on matters of geometric design, determines ways to improve accident prone locations, establishes all speed zones, is responsible for all traffic control devices and operates the sign shop and centerline striping activities, and includes the State's Accident Record Bureau.

Ed's hobbies are golf; photography; running his son Jim's (eight years old) electric train, and square dancing.

He is a member of the Nebraska Engineering Society, Lincoln Engineers Club, and American Society of Civil Engineers, and is a registered professional engineer in Nebraska. He is presently Chairman of the Committee on Speed Characteristics of the Highway Research Board, and the Committee on Roadside Control of the American Association of State Highway Officials.

DONALD W. LOUTZENHEISER (Assoc. Mem., ITE), as a boy, had many occasions to admire the slow majestic movements of vast cumulus clouds across the sky during the hot summer days in Nebraska. He often mused at the possibilities of arranging for orderly, continuous streams of these random masses. After a series of what he considers lucky breaks in being at

the right place at the right time, the last dozen years have been spent in trying to dope out just what it takes to produce the same ideal in vehicle movements on our highways at a good but safe speed.

On finishing high school, Don's first break led him to a summer's job as a Chainman on a State highway project. Here the Engineer's patient explanations and instructions "sold" him on the field and he entered the University of Nebraska to pursue it. Before the fourth year he stumbled into a summer's work with the Bureau of Public Roads on cost and production studies on highway construction. This paved the way so that when he emerged with the B.Sc. label in 1931 he was appointed a Junior Engineer with the Division of Management of the Bureau of Public Roads. This job permitted study of most all types of highway construction, equipment operation and field research on concrete design.

Late in 1933 this job found him in the spot to be assigned to cover South Dakota as a BPR expeditor on county roads being built with drought relief crews of the cropless farmers. In two years of this he toured the State repeatedly and necessarily learned how

State and County Highway Departments are administered and operated. After being moved to Washington, D. C., in 1935, Don was in the right spot to shift to the Division of Design in Public Roads in 1937 on a new line of work.

The AASHO Committee on Planning and Design Policies had been organized and a limited Public Roads staff assigned to collect, draft and prepare for them a series of brochures in the newly recognized field of geometric highway design. For several years Don was a large part of the staff working under the Committee Secretary, and the Association "Design Policies" slowly came into being on drafting and redrafting to the Committee's satisfaction. These policies evolved as a textbook treatment wherein data on vehicle characteristics, driver behavior, traffic operation and control were rationalized with practical design features to determine geometric design standards for modern highways. The completed policies include three on intersection design, in which field Don's interest and study continues.

Again in 1941 Don found himself in a lucky spot as material was being prepared for a Grade Separation policy. His "bossman," Joe Barnett, was placed in charge of the design of the Pentagon Road Network and Don was engulfed in concentrated layout design of expressways, cloverleafs and ramps, with no fooling on the time available. This was followed with the preliminary design of the bridged rotary on the Shirley Highway in Arlington, Va. As a final phase Don handled the design of the system of signs for the Pentagon Network.

"Dame Luck" smiled again in 1944 when an Urban Highway Branch was created in Public Roads. As a charter member Don was made Chief of the Design Development Section in that Branch, his present title. Since then his work has been divided as one of the BPR urban staff acting as design consultants to Cities and States and in the continuation of work on the development and application of geometric design standards.

Don joined the INSTITUTE in 1944 and was an early member of the Washington Section. He has been Section *Veep* and was elected President of the group for the coming year. This year he is Vice-Chairman of the Traffic Engineering Definitions Sub-Committee and continues with the Signs and Markings group. Don served as Secretary for the Committee on Islands during the 1948 revision of the Manual on Uniform Traffic Control Devices.

Don is a member of Sigma Tau, Sigma Xi, and in 1938 received a Professional Degree in Civil Engineering at Nebraska University. He is an Associate member in ASCE and has participated in Highway Research Board activities for some time. He has presented several papers there, one of which received the 1945 award for excellence. In HRB he is a member of the Department of Design and has been Chairman of the Geometric Highway Design Committee since its formation in 1947; he also serves on the Channelization Committee. In the AASHO he is Secretary of the Committee on Design and a member of the Special Committee on Nomenclature. He has written a number of articles and presented papers and lectures at several design and traffic conferences.

Don and his wife Kay are doing their best to keep abreast of their two sons and daughter, now in grade and junior high schools. They live in Arlington, Virginia, and are much enmeshed in PTA and local affairs. Don acquires a deep tan each summer trying to keep the grass trimmed and to work the clay enough to get produce from the garden and fruit trees. He shoots many pictures, both snaps and movies, most with three bored kids as subjects. Currently the whole family is deeply involved in Scout affairs, but manage to find a few nights for sport events and musical concerts. As a suburbanite Don is proud of a major part in continuing a home-to-work car riding pool that has maintained a 5.2 factor for a number of years.

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LOOKING AHEAD

SEPTEMBER 16-19, 1951—DETROIT, MICHIGAN
American Public Works Association. Public Works Congress and Equipment Show.

SEPTEMBER 17-20, 1951—SAN FRANCISCO, CALIFORNIA
56th Annual Meeting, International Municipal Signal Association, Inc. Mark Hopkins Hotel.

SEPTEMBER 23-27, 1951—LOS ANGELES, CALIFORNIA
Annual Meeting, Institute of Traffic Engineers. Ambassador Hotel.

OCTOBER 1-4, 1951—CINCINNATI, OHIO
American Transit Association. Annual Meeting. Netherland Plaza Hotel.

OCTOBER 8-11, 1951—BOSTON, MASSACHUSETTS
American Association of Motor Vehicle Administrators. 19th Annual Conference. Copley Plaza Hotel.

OCTOBER 8-12, 1951—CHICAGO, ILLINOIS
39th National Safety Congress and Exposition of the National Safety Council.

OCTOBER 8-14, 1951—LIMA, PERU
Fifth Pan American Highway Congress.

OCTOBER 22-24, 1951—NEW YORK, N. Y.
33rd Annual Meeting. American Standards Association. Waldorf-Astoria Hotel.

OCTOBER 23-26, 1951—OMAHA, NEBRASKA
American Association of State Highway Officials. Annual meeting.

NOVEMBER 12-15, 1951—ATLANTIC CITY, N. J.
National Electrical Manufacturers Association. Haddon Hall Hotel.

NOVEMBER 25-30, 1951—ATLANTIC CITY, N. J.
Annual Meeting. American Society of Mechanical Engineers. Chalfonte-Haddon Hall.

APRIL 28-30, 1952—WASHINGTON, D. C.
Annual Meeting. Chamber of Commerce of United States.

SEPTEMBER 8-13, 1952—CHICAGO, ILLINOIS
Illuminating Engineering Society. National Technical Conference. Edgewater Beach Hotel.

New Appointments

ARNOLD G. FISCH (Assoc. Mem., ITE), senior civil engineer with the New York State Thruway Authority, was graduated from Rensselaer Polytechnic Institute B.C.E. in 1939, elected to membership in Tau Beta Pi and Sigma Xi, and three years later received his master's degree in civil engineering there. He was an instructor at R.P.I. from 1939 until 1944.

During the war, he was an officer with the U. S. Navy's Civil Engineer Corps, and served with the Seabees in the Solomon Islands, at Okinawa, and in the Public Works Department of the 14th Naval District, Pearl Harbor.

Immediately after his discharge in 1946, Mr. Fisch entered State service as assistant civil engineer (traffic) with the Bureau of Arterial Route Planning, and three years later was promoted to senior civil engineer (highway planning). Unitil he joined the staff of the Thruway Authority in July, 1951, he was engaged in the preparation of Urban Area reports for the various cities in the state.

Mr. Fisch is a member of the Society of American Military Engineers and is active in church work and the local CEC unit of the U. S. Naval Reserve. He is a licensed professional engineer in New York State.

Mr. Fisch is married and resides in Albany with his wife and two children.

ON THE SHELF

Compiled by
Mrs. Kathryn Cassidy, Librarian
Yale Bureau of Highway Traffic

Center for Safety Education, New York University

25 Years of Research in Safety Education: Research on the Doctoral or Equivalent Level—1926-1950. The Center, 1951. 76pp.

A compilation of digests of the reports on research projects devised and carried out at the Center for Safety Education in the last twenty-five years. The purpose of the digest is to make available for wider distribution much of the information gathered during these years but heretofore published only in Ph.D. dissertations and similar reports of limited circulation.

Chicago Department of Purchases, Contracts and Supplies

Parking Meter Survey. The Department, 1949. Variously paged, mimeo.

The survey contains results of laboratory tests on seventeen meters representing eight companies; a national survey of parking meter usage in the top 100 cities in population; a survey made in cooperation with the National Institute of Governmental Purchasing and the completed surveys submitted by other cities.

Eno Foundation for Highway Traffic Control

Turn Controls in Urban Traffic. Prepared by the Staff of the Eno Foundation. The Foundation, 1951.

A study which endeavors to demonstrate "whether a mathematical relationship could be established between conflicting vehicle turns and crossing pedestrians." The results are based on limited samples and do not apply to all conditions, but some definite mathematical relationships have been established.

Gomez, R. A.

Intergovernmental Relations in Highways. Number 2 in a Series of Research Monographs Edited by William Anderson and Edward W. Weidner. University of Minnesota Press, c1950. 123pp.

After a brief account of the historical background and the general federal-state framework within which highway administration and constructing are carried on, this monograph deals in detail with the relationships of the township, city, county, state and federal units of government as they participate and cooperate or conflict in the parts of their activities which deal with highways. The study is of those relationships in Minnesota, but is generally applicable to other states where similar developments creating similar overlappings and duplications of authority are apparent.

Highway Research Board

Use of Parking Meter Revenues. Bulletin No. 33. The Board, 1951.

A report by David R. Levin, presented at the twenty-ninth annual meeting, 1949. The report examines the present use of the parking meter as an aid in the alleviation of the parking problem; the revenue it produces and the possible uses of that revenue. It covers also the legislative bases for the installation and use of meters. The appendix contains a summary of legislation and judicial decisions by states.

Institute for Applied Experimental Psychology

Handbook of Human Engineering Data for Design Engineers. The Institute, Tufts College, Medford, Mass. 1950. Mimeo. $5.00.

A compilation of basic information on hearing, vision, intelligence and other human capacities and traits as they become important in the design of machines which human beings are to operate. The Handbook was compiled by the Institute under contract for the Special Devices Center of the Office of Naval Research. It should be ordered from the Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. The serial number is PB 100814 (mimeo.) $5.00.

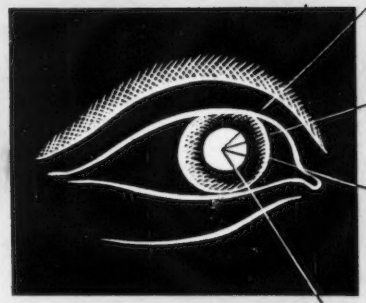
Institute of Traffic Engineers, Western Section

1950 Proceedings, Third Annual Meeting. Hollywood, Roosevelt Hotel, Los Angeles, California, August 3-4, 1950. 64pp., mimeo.

Contents: "Traffic Engineering and the Nation," by R. S. Holmes; "California Freeways," by J. C. Young; "Operation of Portland's One-Way Street System," by Fred T. Fowler; "Sacramento's Experience with One-Way Streets," by D. Jackson Faustman; "One-Way Street Systems in Small Communities," by F. B. Crandall; Panel Discussion on One-Way Streets; "The Role of the Motor Truck in Highway Traffic," by Wade Sherrard; Panel Discussion on "The Role of the Motor Truck in Highway Traffic."

McCarty, John F.

Highway Financing by the Toll System. (1951 Legislative Problems, No.



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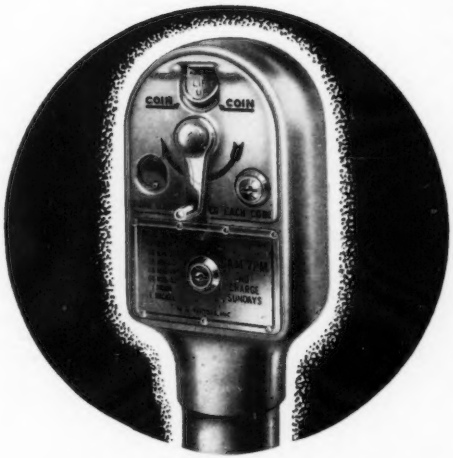

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3). Bureau of Public Administration, University of California, Berkeley 4, California. 1951. $1.00.

This report on toll roads was prepared at the request of the California legislators. It briefly reviews the historical use of toll roads in this country and the modern development of them; discusses the legal framework for toll road administration and the financial experience of the major toll roads now in use—the Pennsylvania Turnpike, the Maine Turnpike, the Merritt Parkway and the New Jersey Turnpike; and presents the arguments for and against an expanded use. The final section deals with the feasibility of a toll road along any one of four possible routes between San Francisco and Los Angeles. A selected bibliography is included at the end of the report.

Mills, Edwin L.

Recent Developments in Instrumentation and Control of Traffic Noise. (Technical Report No. 1). Western Highway Institute, 417 Market Street, San Francisco 5, California.

A discussion of tests of road noises made with a three band sound pressure meter which gave much closer correlations with jury judgments than any meter previously used. These and further tests may point the way to reduction of exhaust noises to the point where they will no longer be the major factor in highway noise.

National Highway Users Conference

The Highway Transportation Story in Facts. Washington, D. C., The Conference, n.d. 32pp.

The factual story, graphically illustrated of the $30 billion annual business which is represented in the manufacture and use of motor vehicles, the manufacture, use and taxation of fuels and the building and maintenance of highways.

New York Department of Commerce, Bureau of Planning

Solving Parking Problems; a Guide to Community Action. The Department, 1950. 64pp., maps, illus.

A book of directions on how a community can go about improving its parking situation. It discusses the organization of a committee to supervise the survey of existing conditions and any remedial measures which may later be taken. It then outlines clearly and concisely the kinds of information which are essential before a reliable understanding of the existing conditions may be obtained. Explanatory discussions of each point follow the outline. Various methods of acquiring land and financing off-street parking space are discussed with arguments for and against each method, and the community program which must follow in order to enlist public support for whatever methods are adopted is explained. The report contains sample survey sheets, drawings of curb parking spaces at various angles, suggestions for laying out parking areas, laws regulating parking, a bibliography and a sample map showing land possibly available for parking.

New York Joint Legislative Committee on Interstate Cooperation

Progress in Motor Vehicle and Highway Regulation Through Interstate Cooperation; a Record of Achievements in the Ten Northeastern States. The Committee, 1950. 35pp.

Recommendations of the Northeastern Conference on such subjects as standards for pavement markings, uniform school bus laws, traffic signals and stop signs, safety education, motor truck regulation, etc., with charts showing state adoption of the recommendations.

Ohio Traffic Safety Conference

Proceedings of the Sixth Ohio Traffic Safety Conference, Combined with *Proceedings of Fifth Ohio Traffic Conference.* Held as Traffic Safety Section, All Ohio Safety Congress. Columbus, Ohio, The Conference, 1950.

"Ways and means of state-local cooperation in a coordinated traffic safety program were discussed at both Conferences, sponsored by the Governor's Traffic Safety Coordinating Committee of State Officials and the Ohio Traffic Safety Council."

Rice, Paul W.

Tulsa Parking Survey, 1950. Prepared for the City of Tulsa, the Tulsa Chamber of Commerce, the Tulsa County Master Plan Committee, by Paul W. Rice, Traffic Engineer, City of Tulsa, Oklahoma. 1950. 39pp.

A factual survey of the parking situation in the central business district of Tulsa. It includes an inventory of the present facilities and the use made of them; a cordon count of vehicles entering and leaving the survey area and a survey by interview of the origin and destination of the trip, the vehicle type, type of facility used, the time parked and the time of departure for each passenger car and truck.

Shattuck, I. S. and Rykken, K. B.

Highway Thorofare Planning and Programming in Relation to Urban Planning and Development. Highway Research Board, 1950. Bulletin No. 31. Cover title—*Highway Planning.* Presented at the twenty-ninth annual meeting. 21pp., mimeo.

On the theory that highway and urban planners have had the need for planning highway facilities impressed upon them, this bulletin has been prepared to serve as a reminder of this need and to outline a technique for adequate planning before executing.

Triborough Bridge and Tunnel Authority

The Traffic Improvement of Bruckner Boulevard from the Major Deegan Expressway and the Triborough Bridge to the Bronx River Expressway, near Longfellow Avenue, Borough of the Bronx—New York. The Authority, n.d., unpaged.

An illustrated report of the proposed improvements with estimated effect of improvement on traffic capacity and estimated construction cost.

Special or Benefit Assessments for Parking Facilities

By David R. Levin and Conya Hardy

Many methods of financing and creating facilities for off-street automobile parking have been advanced in recent years. Among these methods, the benefit district has many features which make it a sound and attractive way to finance off-street parking facilities in certain types of retail business districts.

Bulletin No. 15, "Special or Benefit Assessments for Parking Facilities," has been especially prepared for the Urban Land Institute by David R. Levin, Chief, and Conya Hardy, Highway Economist, of the Land Studies Section of the Bureau of Public Roads. It is an objective and authoritative analysis of past and present experience in benefit district financing as applied to parking. The Bulletin covers in detail such aspects as enabling legislation, financing provisions, methods of assessment, court cases, and current operating experience. The relative merits of the parking benefit district are analyzed and suggestions made for further development of methods.

This Bulletin will be of particular value to public officials, merchants, and commercial property owners who are seeking practical methods of solving the off-street parking problem in their municipality or commercial district.

Copies of Bulletin No. 15 may be obtained from the Urban Land Institute, 1737 K Street, N. W., Washington 6, D. C., for $1.50 each.

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Charlotte Study of Truck Operations on City Streets

Improvement Plan for Trucking Operations. The Department, 1951. 17 pp., mimeo., appendix. Charlotte, North Carolina, Traffic Engineering Department.

This report contains the accumulated data and the ensuing recommendations from a truck survey in the city of Charlotte.

Three types of surveys were used to gain the necessary data. The first was composed of a count of all types of vehicles, for a 24-hour week day period, taken from twenty points at key intersections on the numbered State and Federal highways near the fringe of the city; an inner cordon count in which heavy trucks with three axles or more were counted and the name of the company recorded along with the time of arrival and departure; and a middle area cordon count made some time previously.

The second phase of the study was a "block by block analysis of both light and heavy trucks loading and unloading operations" in the central business district, to determine the length of time the trucks consumed in the process and whether they used curb loading zones or parked illegally.

The third type of survey was made earlier and consisted of an extensive origin and destination survey by the State Highway and Public Works Commission of North Carolina.

From the data assembled in these surveys a system of recommended truck routes was devised with recommendations for traffic engineering treatment to expedite the movement of trucks. Heavy trucks were to be prohibited on certain streets except by special permit, and curb spaces for loading and unloading were to be reallocated.

The report does not deal with any long-range program of highway construction, street widening or other extensive improvement, but points a way to more efficient use of the existing facilities.

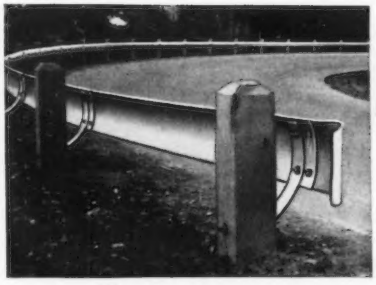
Death Rates vs. Periodic Motor Vehicle Inspection

The Association of Casualty & Surety Companies reports favorable accident experience in states having periodic vehicle inspection. The accident comparison is based upon preliminary estimates of the 1950 fatality figures released by the National Safety Council.

The Association concedes that periodic motor vehicle inspection is not entirely responsible for the fine traffic accident fatality record of states having such a program but declares that states having regular periodic motor vehicle inspection programs are far out in front in reducing the traffic accident fatality toll.

The comparison is shown by the following table:

	Average Death Rates Per 100 Million Vehicle Miles		Percentage That 1950 Average Death Rates Are Above or Below National Average
	1949	1950	
National Average	7.4	7.5	——
States Not Requiring Inspection	7.5	7.8	+ 4.0%
States Requiring Inspection: All States	6.2	6.4	—14.7%
States Having Private Inspection Stations Appointed by the State	6.7	6.9	— 8.0%
States having State-Owned and Operated Inspection Stations	4.8	4.6	—38.7%



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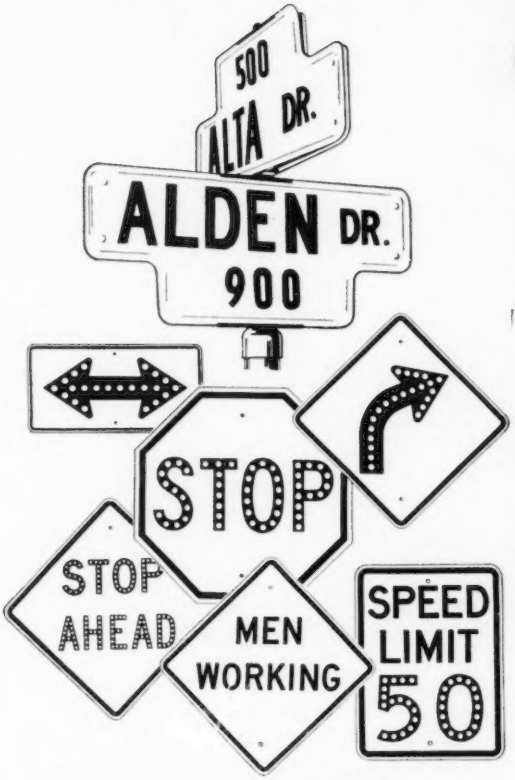

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Highway Transportation Moves More Than All Other Forms of Transport

In a recent pamphlet entitled "Roads to National Security" the National Highway Users Conference states that *"Highway transportation moves more persons and more freight than move by all other forms of transportation combined."*

The motor vehicle occupies a commanding role in the transportation of passengers. In intercity traffic, for example, private motor cars and buses account for more than 90% of all passenger mileage.

Virtually all freight moves all or part of its trip to final destination by motor vehicle. The tons of freight hauled by trucks and truck trailers are several times greater in number than transported by all other forms of transportation. The truck haulage in tons has been variously estimated up to 75% of the total freight tonnage transported in the United States. This includes all motor truck and truck trailer uses, including privately operated as well as for hire, and therefore should not be confused with the comparisons that are frequently made between railroads and for hire trucking with ton-miles as the basis.

According to the pamphlet, freight tonnage by type of transport is estimated as follows:

Trucks 8.3 Billion
Railroads 1.5 Billion
Pipelines 700 Million
Waterways 600 Million
Airways 315 Thousand

Grade Crossing Death, Injury Rate Rises In 1950

In the year 1950, there were 4,000 highway-railroad grade-crossing accidents, or 13.5 per cent more than in 1949. The number of deaths, 1,576, was 4.6 per cent greater and the number of persons injured, 4,368, was higher by 15.7 per cent, according to the Interstate Commerce Commission.

An Open Letter From A Traffic Engineer

Main Street, U. S. A.
August 15, 1951

Dear Traffic Engineer:

I was delighted to hear from you again. In your letter of August 1st you intrigued me with your description of a problem common to many of our smaller municipalities. I agree with you that the citizenry of those towns and villages are genuinely frightened by a transport behemoth of their own creation. Yet while they desire to retain its good features of inter-town connection at bargain rates, they inexplicably show no inclination to use money as a means of housebreaking the monster for proper restraint on their own streets. When, in exasperation and anger, they do lash out at their now overgrown family pet, they do so with a disorganized and scatter-gun tirade which could well be more lethal than intended. Fortunately for transport their aim is bad, and disorganization prevails. That, as I visualize the situation, is where we, you and I as traffic engineers, enter the picture.

Let us approach this then, from the public relations angle, but with a flanking infiltration rather than a frontal attack. In other words, as an old Ozark mountaineer once said: "If you start out and talk yourself out before they can open their mouths, then they have the advantage over you, because they know what they already know and what you know too!" So it is that in any preparation for an approach to these people you should be certain that you have *time* to hear their complaint and study the proposition, *patience* to apply your technical know-how to their specific problem, and a thorough *knowledge of the facts* which provide a background for that problem.

It can scarcely be said with accuracy, that the administrative traffic engineer of today has more time than money. Even though he has little enough of the latter he can generally be found still more deficient in time for the job. I am sure this is true with both of us. Nevertheless we must recognize that tempo and customs vary a great deal throughout our land, and we can hardly hope to create lasting confidence, and a willingness to cooperate with nothing but nimble footwork and a high-pressure sales talk. We should never confuse assent, yielded under duress of dazzling declamation, with simple understanding.

Patience, in case we need reminding, is not just a victorian card game. It is, I am afraid, a rapidly vanishing attribute of the genteel person, and like the sixth toe seems destined soon to leave no trace of its passing. Nevertheless, surprise at its use will only be momentary, and while it lasts it may be used as a supplemental element of attack. Thus, the explanation of a mass of detail is not easy if one confines himself to the specific problems which created the original "whoop-te-doo." None-the-less that is exactly what must be done, and with the patience of *Job*, for unless the facts are analyzed under the merciless glare of the *local* spotlight, time and effort will have been wasted.

It is when we come to "a knowledge of the facts," however, that we are most apt to underestimate the other fellow's mental processes.

The rule might well be written, in bright ink, and high on the wall, that "a knowledge of the facts" means just what it says. While the non-technical official may not understand the reasons or procedures which lead a technical traffic engineer to his conclusions, that official has every right to insist that such background material be presented in unabridged form. His own decision is thus lent the dignity of full scale collaboration, and he will probably become a friend.* (*Note: A species of which the Traffic Engineer needs more).

It has given me a great deal of pleasure to unburden myself in this manner, and I thank you for your indulgence. These ideas of mine are not new. They are not important. They do, however, help to translate knowledge and professional ability into the language of the average man. That, in my humble opinion has long been one of the great and tragic shortcomings of the entire engineering profession.

With best regards,
A TRAFFIC ENGINEER

By Leon Corder (Mem., ITE), Missouri State Highway Department, Jefferson City, Missouri.

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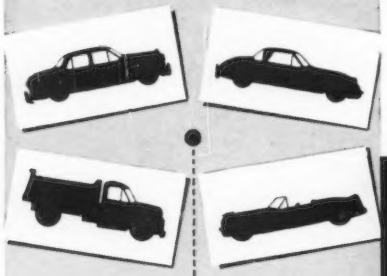

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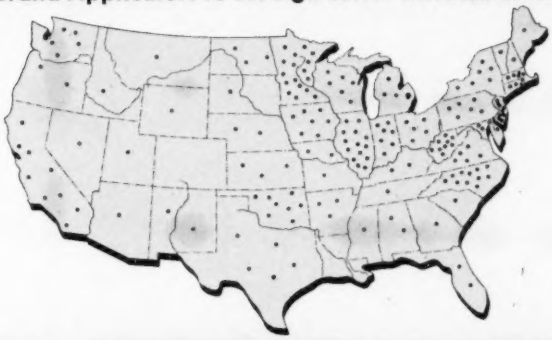

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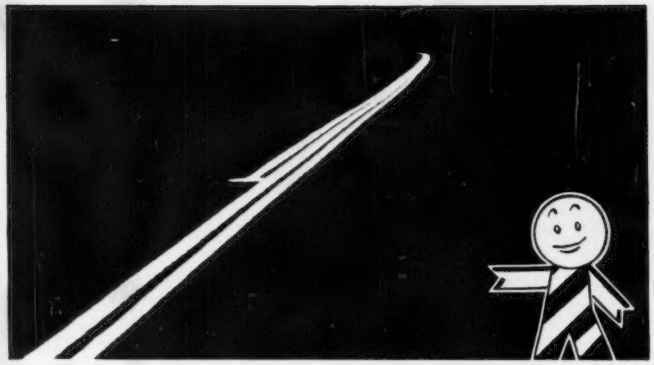

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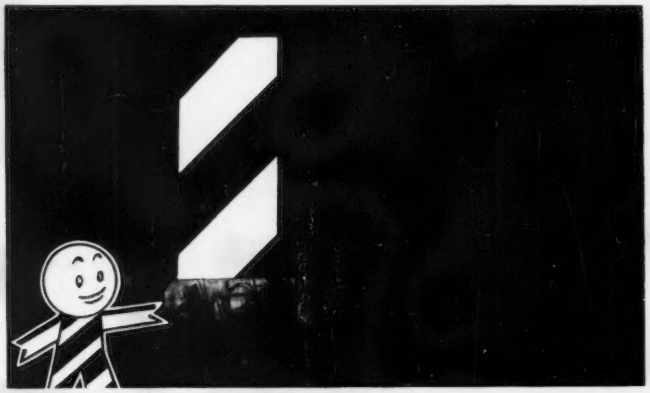

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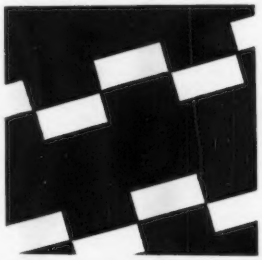

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